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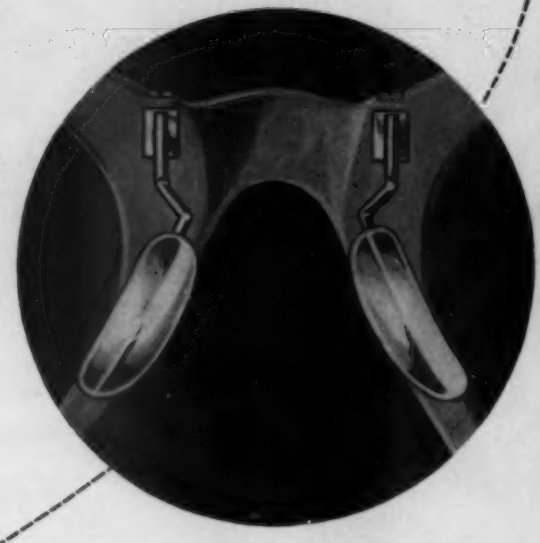

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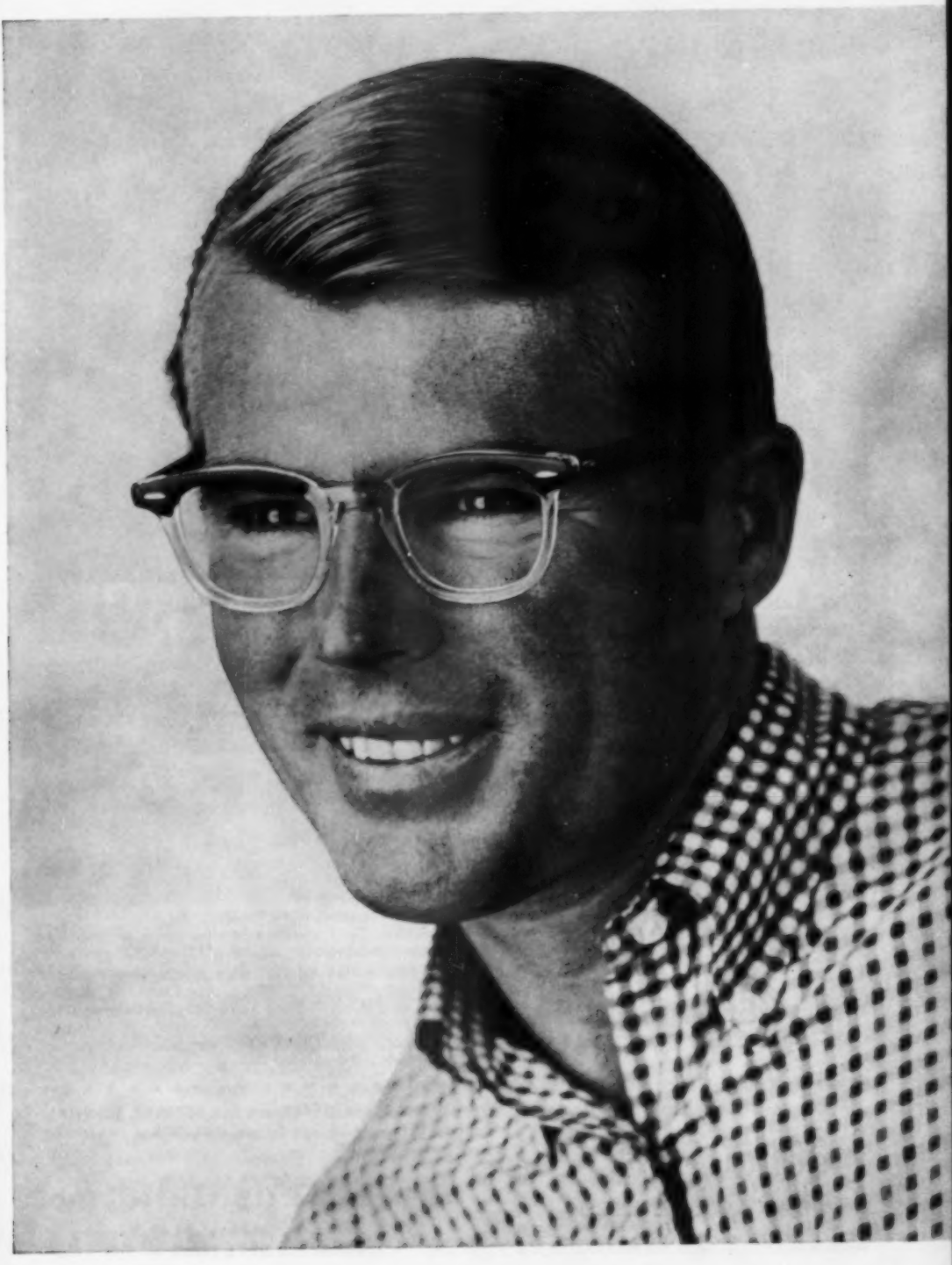

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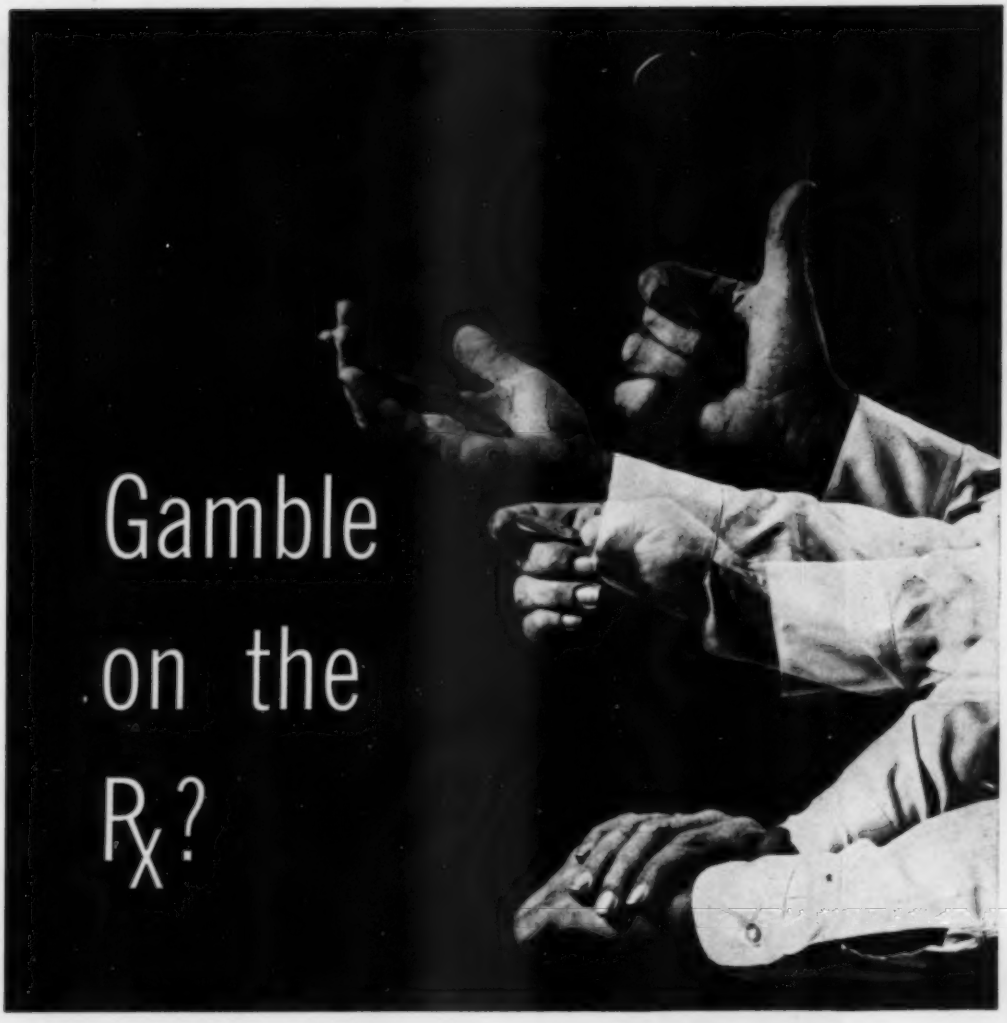

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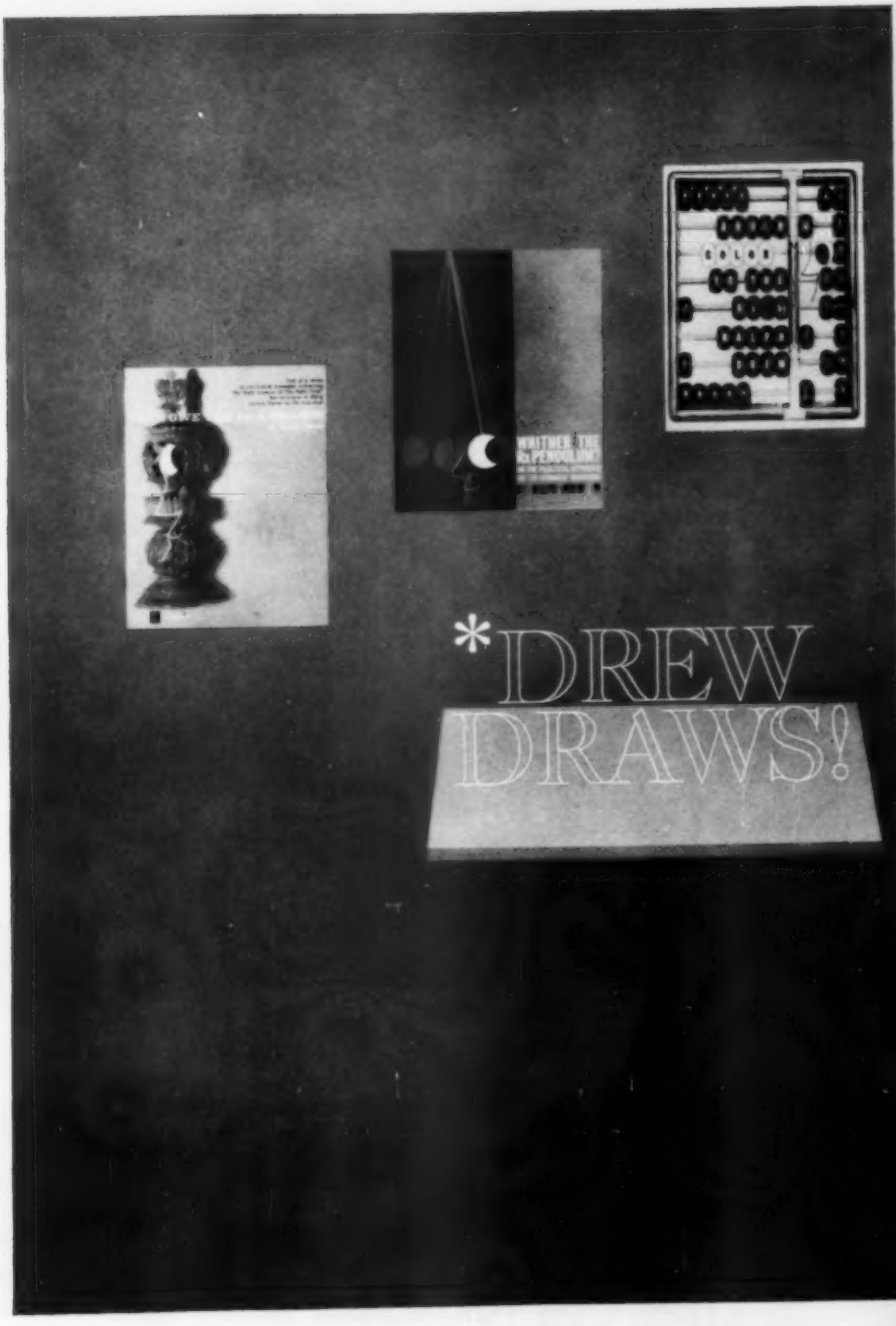
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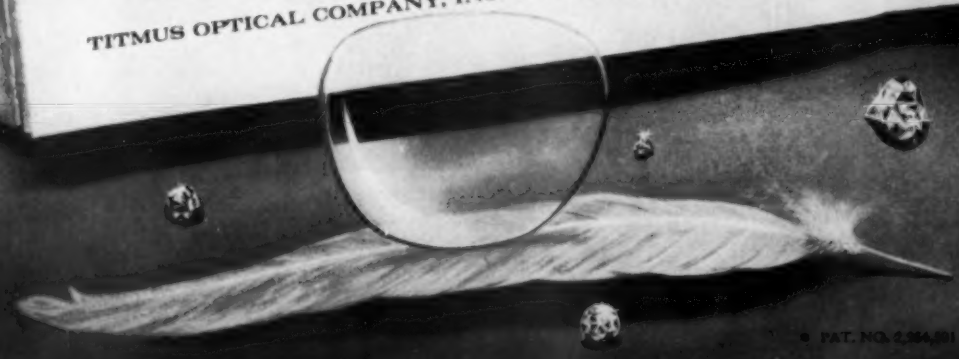

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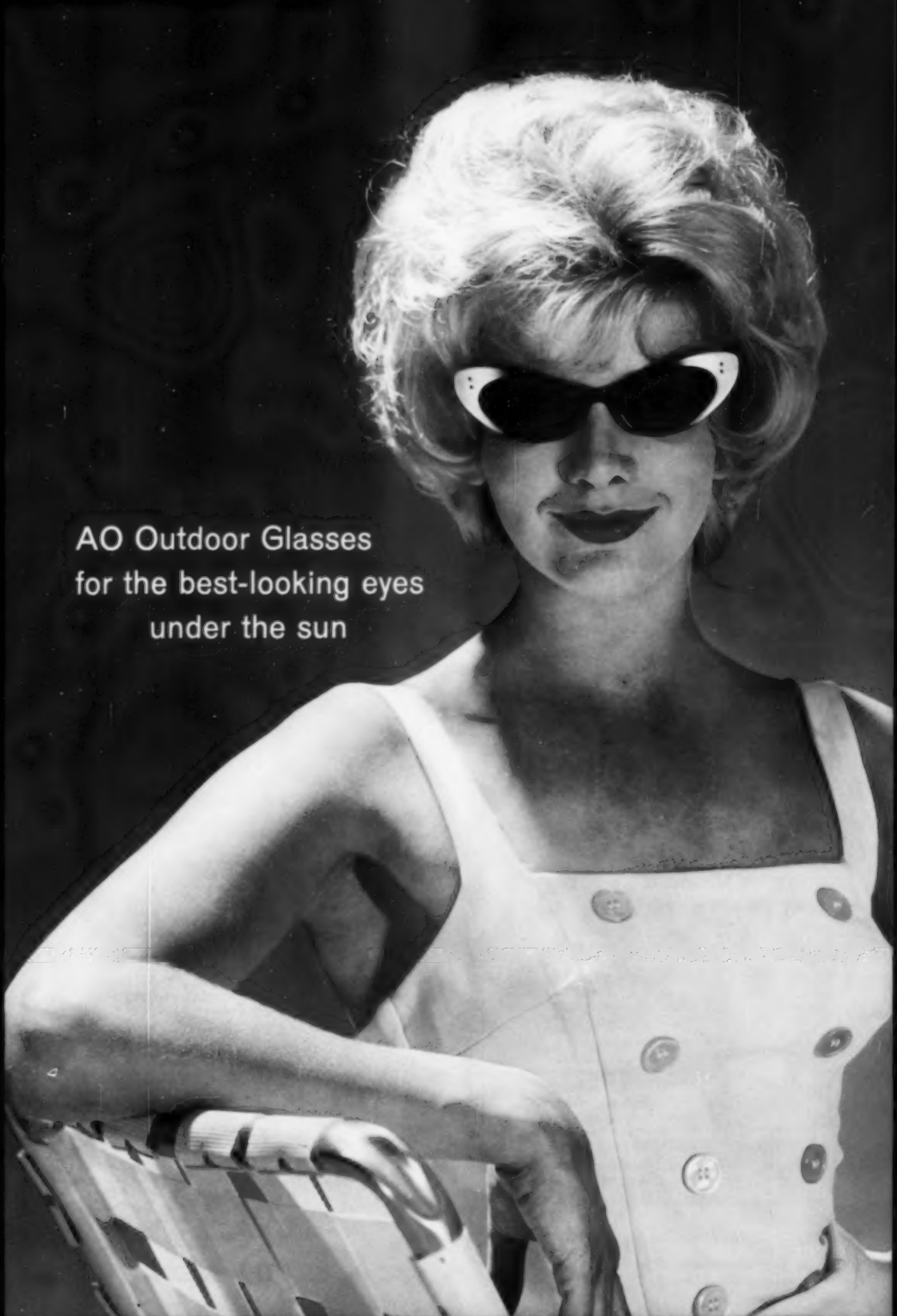
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Shuron

A paper written by Roy Marks, President of Shuron Optical Company, was presented to the Academy of Optometry in December of last year on the subject of children's eyewear. The paper presented a study which was used by Shuron as the basis for the design of a completely new line of children's frames. These frames, soon to be marketed, are called Pedioptic Frames. The study revealed strong criticisms of present frames for children. Because of the importance of this subject, we are devoting this month's "Shuron Report" to an article by Mr. Marks.

ARE WE DOING ENOUGH for CHILDREN?

The "population explosion" talked about in newspapers, books and magazines is a very real fact in this country. And—as those concerned with the overcrowding of schools, for example, are only too well aware—the "explosion" means a substantial jump in the child population, both in total percentage and in absolute numbers.

Are we, as an industry, doing enough for these children? The answer—surprising and unflattering—is a resounding "No."

You may have read or heard about the recently announced extensive 2-year research programs, carried out by Shuron, on the subject of children's eyewear. This research made it very clear to us that today's frames for children fall deplorably short in the areas of sound design and structure. It furnished us with both motivation and opportunity to take a major step in fulfilling the discovered needs.

When we first decided to bring out a totally new line of children's frames, we were determined to do it on a scientific basis . . . to discover, with modern sampling methods:

1. Whether there was a need for a complete new design concept. 2. Why present frames were inadequate. 3. How they could be improved.

To carry out this part of the study, practitioners and suppliers in 12 major cities were interviewed, and parental attitudes towards children's eyewear were widely sampled at the world-famous Corning Research Center.

This fact emerged: We, as an industry, have done little or nothing—on a factual, scientific basis—to furnish the proper frames for the millions of children who need visual help. True, we're offered many scaled-down versions of adult frames; inverted the pads, taken steps to strengthen bridge and temple areas. But, as shown by the almost overwhelming verdict of both practitioners and parents, children's are still *far* from satisfactory . . . because, in general, they simply *do not fit!*

Report:

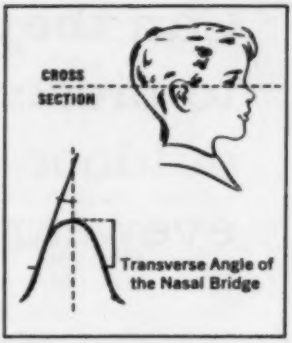
Since a good indication of this became evident very early in our study, we were convinced that something more was needed on which to base our frame designs: Actual anthropometric data on the shape and development of children's faces. We expected to find published research data, with results that we could interpret. Here was the surprise: *No such study* had ever been made! To get this information, we had to do the complete job. For this reason, the study required a full two years of intensive research.

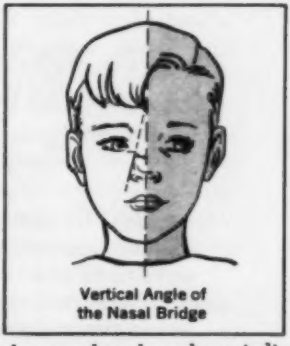
We enlisted, first of all, the skillful cooperation of a renowned anthropologist at Columbia's College of Physicians and Surgeons. His aid was invaluable in setting up the study and in its subsequent completion . . . even to the extent of inventing a new measuring device for the purpose!

As a result of this data-gathering, Shuron now literally possesses the only set of scientific facts on the developmental changes, in two-year age groups, that occur as a result of the growth of the bony structure of the bridge of the nose and the orbital structure surrounding it. It was firmly established that children are *not* miniature adults; that there are definite differences in the bridge area, and that the most significant dimension is the transverse angle of the nasal bridge.

Somewhat surprisingly, the vertical angle of the nose—previously considered the important one—was found to remain practically constant through all periods of growth. Here again, research proved invaluable, in this case showing what is *not* so, even though it was previously acecpted as an obvious and general fact.

The next step was to translate the new data into frames. Shuron design engineers have done so. The new line is appropriately named **Shuron Pedioptic Frames.** The new bridge design, which accurately reflects the changes that occur as the child grows and matures, is called the ***Youthform*** Bridge.





Pedioptic frames are attractively styled, are available in carefully chosen colors, have been judiciously strengthened, and reflect traditional Shuron quality and attention to detail. But other manufacturers can make similar claims about their frame. Where, then, is the difference? The difference lies in the fact that Pedioptic frames are designed to fit children . . . real living, growing children . . . as they actually are, not as someone thinks they are.

I have taken this opportunity to discuss Shuron's answer to a tremendous need, and to tell you of some of the background of this dramatic new line of children's eyewear. Pedioptic Frames will be available to you very soon. I suggest, respectfully, that they present a wonderful opportunity to you . . . and to the children who are your patients.

Keep Abreast of Shuron news and products by watching for "Shuron Report" in this publication.

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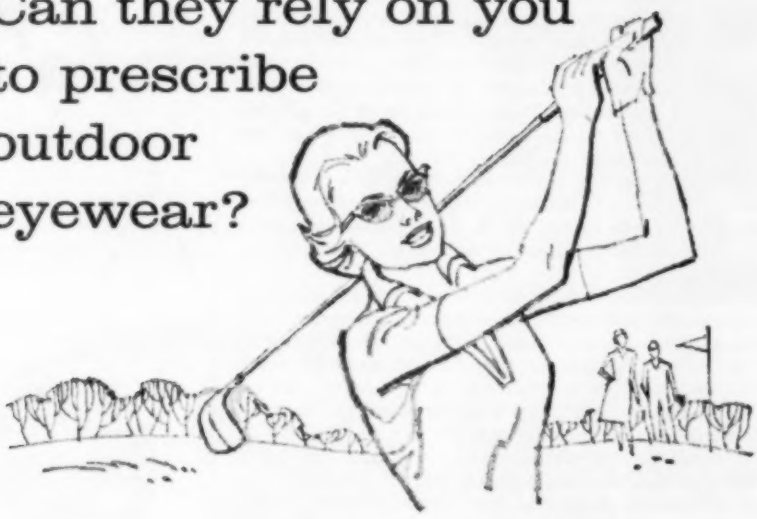

IF NOT, the alternative is clear. They'll be making impulse, spur-of-the-moment purchases from clerk-dispensed or self-serve racks and displays. Absent will be the important considerations of professional eye care, an up-to-date prescription, Rx-ground lenses, personal selection, proper fitting and continuing service. Give your patients the benefit of your *professional* service.

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Vol. 38 May 1961 No. 5

CLINICAL USE OF THE KERATOMETER IN EVALUATING THE CORNEAL CONTOUR*

Theodore Grosvenor†
College of Optometry, University of Houston
Houston, Texas

INTRODUCTION

The fact that the curvature of the cornea tends to decrease toward the periphery is becoming increasingly apparent to those optometrists who are engaged in the fitting of corneal contact lenses. In the early days of corneal lens fitting, it was found that the back surface of the lens had to be ground several diopters flatter than the central corneal curve, in order to keep the lens from impinging upon the flatter corneal periphery. Later on, it was found that the problem of the corneal periphery could be solved by fitting a lens with its back surface parallel to the central corneal curve but so small in diameter that it impinged but little upon the flatter portion of the cornea.

Still later, the problem was solved in a still different manner. It was found that a relatively large lens could be fit parallel to the central corneal curve if an additional flatter curve was ground into the peripheral portion of the lens. Some optometrists have recommended the inclusion of several such curves, in order to approximate the corneal contour as much as possible, and to allow for sufficient circulation of air and lacrimal fluid.

Our knowledge of the corneal contour dates back to the early investigators. For example, Helmholtz[1] concluded that the cornea was ellipsoid in cross section due to the fact that he found that it flattened toward the periphery.

Tscherning[2] discussed at length the work of Eriksen concerning the corneal contour. Using an ophthalmometer, Eriksen found that the optical zone comprised about half the width of the cornea. He defined the optical zone as "that part the refraction of which does not differ more than one dioptry from the central refraction." He also concluded

*Read before the annual meeting of the American Academy of Optometry, Chicago, Illinois, December 13, 1959. For publication in the May, 1961, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
†Optometrist. Ph.D. Fellow, American Academy of Optometry.

that the corneal axis was decentered about five degrees outwards and a little downwards; and that the pupil was decentered outwards about five degrees from the visual line and slightly upwards or downwards. Again quoting, "this decentering of the pupil may, therefore, compensate for the obliquity of the cornea, so that it is especially outwards that we must expect to notice the effect of the peripheral flattening." By reflecting squares of light from various parts of the cornea and noting the shape of the image produced in each case, Eriksen found that the curvature of the cornea begins to decrease at about twenty degrees from the visual line, is at its lowest at about thirty degrees from the visual line, and increases again at thirty-two degrees from the visual line, at which point the image is very near the limbus.

Gullstrand[3] used a keratoscope, taking photographs of the corneal image of the keratoscopic pattern as the subject fixated in each of five positions, and obtained measurements at five degree intervals from five to forty degrees in both the horizontal and vertical meridians of the cornea. He plotted these measurements upon a graph which showed, for each meridian, how the curvature of the cornea varied from the center toward the periphery. He used as the zero point on the graph, the point corresponding to the measurement taken when the subject looked directly into the objective of the instrument, and he called this point the "ophthalmometric axial point."

He concluded that the central optical zone, which had an approximately spherical curvature, extended horizontally about four millimeters and was decentered outwards and a little downwards from the ophthalmometric axial point. He found that the peripheral parts of the cornea were flattened, decidedly more so on the nasal side than on the temporal side, and usually more so upwards than downwards. Gullstrand performed an additional experiment leading him to conclude that the pupil is decentered outwards and downwards from the ophthalmometric axial point, nearly corresponding to the decentration of the optical zone. He, therefore, was of the opinion that in most eyes the optical zone can be considered to be central with respect to the pupil.

Fry[4] described the cornea as a cone-shaped structure with a torodial or spherical cap. Bier[5] concluded that the cornea had a regular central zone which is from four to six millimeters in diameter, a negative zone which is three millimeters in diameter, and a more peripheral positive zone one to two millimeters in diameter. He found that the optic cap is decentered nasally and superiorly, contrary to the findings of previous investigators who found it decentered temporalwards and inferiorly. This apparent conflict can be at least partially resolved if it is under-

stood that Bier used the geometrical center of the cornea as a reference point, while previous writers used the line of sight, or Gullstrand's ophthalmometric axial point, which amounts to the same thing. In addition, it should be noted that the amounts of decentration found by Bier were very small, being only 1/5 to 3/5 millimeters nasally and 1/5 millimeter superiorly.

Moss[6] investigated the corneal contours of ten subjects, checking the fluorescein pattern due to each of several corneal lenses of differing radii and diameters, and concluded that Bier was correct in his concept of the negative zone of the cornea. May[7] investigated the corneal contour using a Bausch and Lomb keratometer. Reporting on ten subjects, he found that the amount of flattening in the corneal periphery, averaging nasal and temporal values, ranged from an average of .18 D. at a point 1.17 millimeters from the center of the cornea to an average of 3.5 D. at a point 5.7 millimeters from the center. In an article in a recent issue of TODAY[8] it was suggested that certain points on the Bausch and Lomb keratometer mire may be used as auxiliary fixation points, in order to gain information concerning the corneal periphery, as a part of the examination procedure previous to the ordering of contact lenses. Bayshore[9] and Feinbloom[10] have reported on the use of auxiliary fixation points, in using the keratometer to evaluate the corneal periphery in routine contact lens practice.

Reynolds[11] has used a keratoscope as a means of studying the corneal contour, employing an electronic computer in order to analyze the keratoscopic photographs. He has found that the curvature of the corneal periphery varies with the temperature of the cornea and with the time of day, while the curvature of the central portion remains relatively constant.

SCOPE OF THE PRESENT STUDY

The scope of the present study is threefold:

1. To determine the topography of a large number of corneas in order to determine the average findings and the individual differences existing in regard to variables such as diameter of the optic cap, decentration of the optic cap, and the amount of peripheral flattening.

2. To study the corneal contours of contact lens patients, both before and after the fitting of lenses, to ascertain the effects of contact lens wearing upon the corneal contour and contrariwise to evaluate the role of the corneal contour in determining whether or not the patient will be successfully fitted with contact lenses.

3. To ultimately recommend a clinical method which may be used by optometrists as an adjunct in ordering lenses, anticipating fitting

problems before they occur, and in solving those fitting problems which do occur.

INSTRUMENTATION

A specially adapted Bausch and Lomb keratometer was used in this investigation. The adaptation consists of the addition of the target arrangement shown in Figure 1, which was produced by applying one

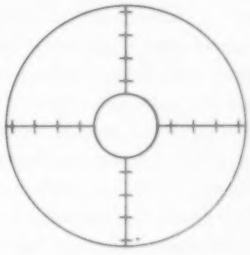

FIGURE 1
FIXATION PATTERN

millimeter wide strips of masking tape to the keratometer mire plate. The masking tape provides sixteen auxiliary fixation points, each intersection of a vertical and a horizontal strip constituting a fixation point. These auxiliary fixation points are located 14, 21, 28, and 35 millimeters from the center of the mire plate and correspond to points approximately two, three, four and five millimeters from the ophthalmometric axial point along a straight line tangent to the cornea.

It should be noted that when we measure the "diameter" of a contact lens, or when we measure the width of a "zone" of a contact lens, we are not measuring along the curved surface of the contact lens but are actually measuring the length of a chord of the curved surface. Similarly, when we estimate the "diameter" of a patient's cornea, using a millimeter rule, we are actually measuring the length of an imaginary line which may be considered as parallel to a chord of the corneal surface. Therefore, in this investigation the fixation points were selected in such a manner that they correspond to points along a line tangent to the cornea, rather than corresponding to points along the surface of the cornea.

METHOD

The keratometer reading was first taken in the horizontal meridian in the usual manner, the patient fixating the image of his own eye. He

was then asked to fixate respectively the first, second, third and fourth points to his right and then to his left, a keratometer reading being taken in the horizontal meridian as he fixated each point. Once the central reading was taken, the keratometer was locked into position and the patient was cautioned not to move his head. Frequent rechecks of the central reading were taken intermittently with the peripheral readings, in order to make sure that the head position had not changed.

The keratometer reading was then taken in the vertical meridian in the usual manner, after which readings were taken with the patient fixating each of the vertically placed fixation points.

The data were then plotted on a graph, as shown in Figure 2, in which corneal curvature is plotted against points on the cornea. For each eye two plots are necessary, one for the horizontal meridian and one for the vertical meridian.

ANALYSIS OF THE DATA

Each graph was analyzed in each meridian in regard to the diameter of the optic cap, the position of the corneal apex, and the amount of peripheral flattening.

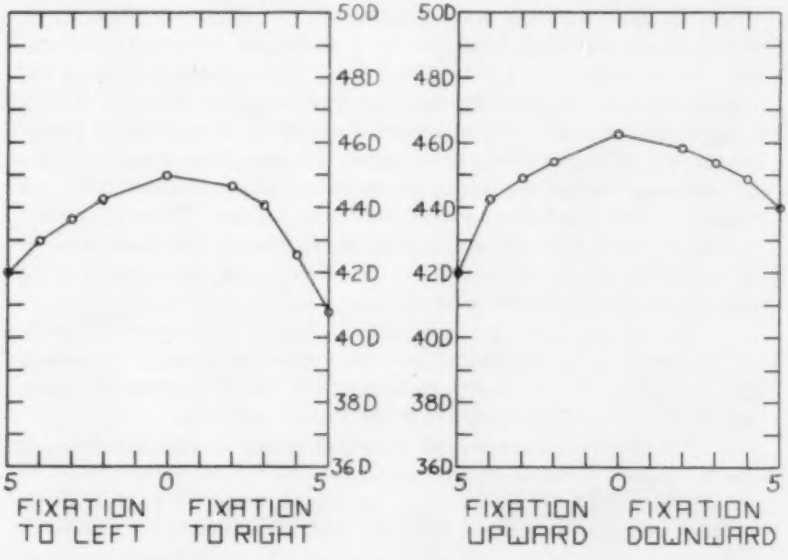

FIGURE 2
TYPICAL DATA

The diameter of the optic cap is considered as the width of the cornea through which the curvature varies no more than one diopter, and is determined by measuring a horizontal line drawn across the graph at a level one diopter below that level representing the maximum curvature. The position of the apex is determined by visual inspection of the graph, the apex being considered as the point of greatest curvature. If there are several points all representing the maximum curvature, the center of this "zone" of equal curvature is considered the corneal apex. The amount of flattening is determined by measuring the maximum decrease in curvature in either direction: right and left or up and down, as the case may be.

RESULTS OBTAINED ON SUBJECTS NOT WEARING CONTACT LENSES

This group of subjects consisted of 17 individuals, none of whom had worn contact lenses except for one subject who had ceased wearing the lenses one year previously. Data were taken upon the right eye of each subject with one exception: One subject was amblyopic in the right eye and could not see the fixation points, so the left eye was tested in this case.

Of the 17 subjects, average decentration of the corneal apex in the horizontal meridian was found to be ½ millimeter temporally, with a range extending from zero to 1 millimeter temporally, no corneas being found with nasal decentration. Average decentration of the corneal apex in the vertical meridian was found to be zero, with a range extending from ½ millimeter upwards to 2 millimeters downwards, the latter decentration occurring for only one cornea. Of the 17 subjects, five had no vertical decentration, upward decentration was found for seven, and downward decentration for five. These data, then, appear to show that decentration in the horizontal meridian tends to be exclusively in the temporalward direction, while decentration in the vertical meridian is likely to be either upward or downward.

The diameter of the optic cap was found to average 5.0 millimeters, both in the horizontal and the vertical meridians. The diameter ranged from 3.0 to 7.5 millimeters in the horizontal meridian, and from 3.0 to 8.0 millimeters in the vertical meridian.

The maximum amount of flattening in the corneal periphery, in the horizontal meridian, was found to have an average value of 6.00 D. nasally and 3.00 D. temporally, the ranges being from 4.00 D. to 8.00 D. nasally and from 1.50 D. to 8.00 D. temporally. The maximum amount of flattening in the vertical meridian was found to average 4.00 D. both upward and downward: the ranges being from 1.50 D.

to 7.00 D. upwards and from 2.00 D. to 7.00 D. downwards. The data in regard to the amounts of flattening, therefore, show that the amount of flattening appears to be greatest in the nasal direction, least in the temporal direction, and between these two extremes in the upward and downward directions.

RESULTS OBTAINED ON CONTACT LENS WEARERS

Corneal contours were mapped on several contact lens wearers, all patients at the University of Houston Clinic. The majority of these presented fitting problems of one kind or another.

For example, patient K. T. had worn contact lenses comfortably for several weeks, but the slit lamp examination revealed dimple veiling in the superior portion of the left cornea, which continued to persist in spite of the fact that several modifications and lens changes had been made. The results of the corneal mapping for the left eye of this patient (Figure 3) showed the following:

In the horizontal meridian, the apex was decentered approximately two millimeters temporally, the point of highest curvature occurring two millimeters temporal to the ophthalmometric axial point (as de-

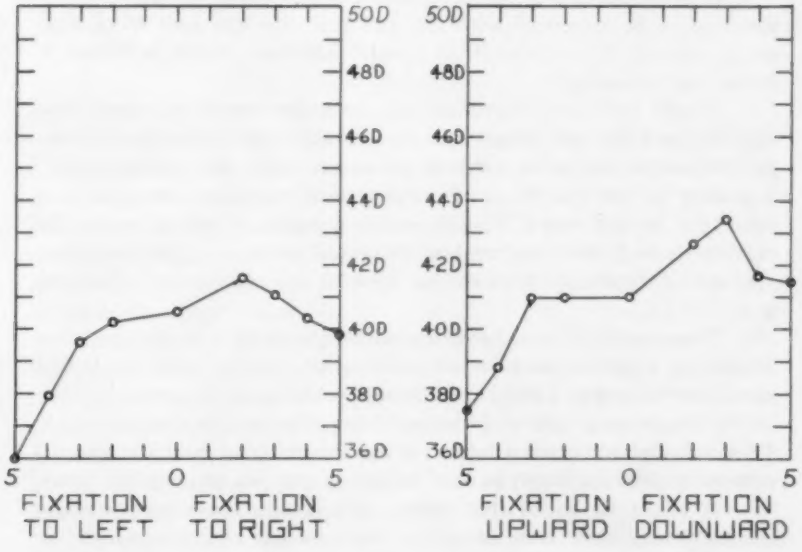

FIGURE 3
DATA FOR SUBJECT K.T.

fined by Gullstrand) and having a dioptric value 1.00 D. higher than the value found when the patient fixated the image of her eye in the usual manner. The peripheral flattening amounted to approximately 5.00 D. nasally and 1.50 D. temporally. In the vertical meridian the apex was decentered upward approximately 2½ millimeters, the curvature at a point 3 millimeters upward being 2.50 D. steeper than the curvature found with central fixation. The amount of flattening was 2.00 D. in the upward direction and 6.00 D. downwards. In addition, the width of the displaced optical cap was only 3 millimeters in the horizontal meridian and 2 millimeters in the vertical meridian.

The question now arises as to whether this unusual corneal contour was a result of the wearing of contact lenses, or whether the corneal contour had these unusual characteristics prior to the wearing of contact lenses and was therefore responsible for the fitting problem which was encountered. A logical way to solve the problem would be to have the patient refrain from wearing her contact lenses temporarily and to ascertain whether or not the corneal contour changed after several weeks, but the patient was quite reluctant to do this.

Another patient, B. J., complained of a burning sensation which appeared to be associated with the fact that the lens rode quite high on the cornea. The results of his corneal mapping, shown in Figure 4, reveal the following:

In the horizontal meridian, the curvature varied no more than one diopter from the central curvature in either the nasal or the temporal direction, the total width of the cornea being the "optical zone," according to our definition. In the vertical meridian, the apex was found to be decentered 3 millimeters upward, at which point the curvature was 2.00 D. higher than the central curvature. The maximum amount of flattening in both the upward and downward directions was 2.00 D.

If we were confronted with a corneal contour such as this one when examining a patient prior to the ordering of contact lenses, we would have every reason to believe that fitting problems would occur, in view of the almost total lack of peripheral flattening and the displaced apex. However, this patient has been wearing contact lenses and the unusual contour could conceivably be due, at least in part, to wearing the lenses.

It might be added that other patients who have been wearing contact lenses have been found to have corneal contours which are normal in every respect, a fact which tends to support the idea that in the above problem cases the unusually shaped cornea could be a cause of the fitting problem, rather than being a result of wearing contact lenses.

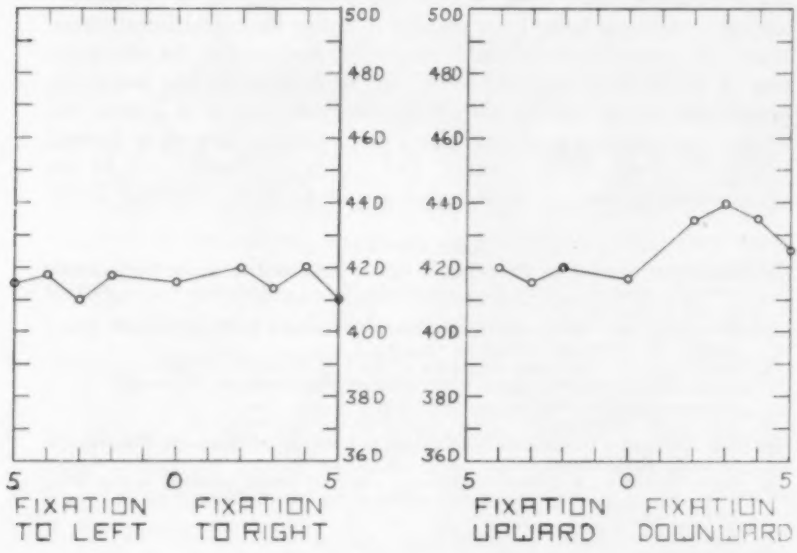

FIGURE 4
DATA FOR SUBJECT B.J.

DISCUSSION AND CONCLUSIONS

In conducting this investigation, once the keratometer reading was taken in the usual manner, the instrument was locked into position for all subsequent readings. When this is done, the axis of the telescope (as shown by the cross-hair focusing target) is not aligned with the central mire image. This lack of alignment was found to introduce an error of approximately ±.37 D., depending upon the direction and extent of the decentration.

In measuring the curvature of the peripheral corneal "zones" as was done in this investigation, one tacitly assumes that the centers of curvature of the various corneal zones are aligned along what one may call the "ophthalmometric axial line," a line connecting the ophthalmometric axial point with the center of curvature of the optical zone of the cornea. At the present time, there is no way of ascertaining whether or not this assumption is correct.

In spite of the fact that such possible errors are involved, they are not sufficent to detract from the usefulness of the experimental procedure, so long as one does not arrive at unwarranted conclusions in

interpreting the data. Even though future development of photokeratoscopic procedures holds great promise in aiding us to gain information about the corneal contour, the keratometric method has the advantage that it is clinically applicable and can be utilized by the practicing optometrist in the care of his contact lens patients. It is hoped that further experimental work will give a more adequate concept of normal variations of the corneal contour, and a greater understanding of the relationships between the corneal contour and the fitting of contact lenses.

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DISCOMFORT GLARE*

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The term "glare" includes a broad complex of physiological, psychological and physical factors which combine to determine whether the brightness relationships within a visual environment contribute favorably or unfavorably to the seeing conditions. These brightness relationships may influence the visibility of a visual task or their effects may be less obvious and result in decreased ease of seeing. Thus, glare may be divided into two generally distinct but related categories: disability glare and discomfort glare.

Disability glare usually is obvious. In the common experience of approaching headlights on a highway, visibility is reduced primarily by the veiling brightness produced within the eye by the glare sources. Such a situation also is uncomfortable. A loss in visibility also is caused by specular reflections from within a visual task, as for example, from a glossy photograph. In this case the apparent contrasts within the task are reduced by the changes in relative brightnesses of the details and their immediate background. The situation may not be particularly uncomfortable, but certainly is visually disabling. On the other hand, brightnesses within a visual environment may be such that there is no measurable reduction in visibility but nevertheless produce a feeling of discomfort. An example of this is excessively bright luminaires of a lighting system. It is this last situation which is of immediate concern.

The ultimate objective of investigations of discomfort glare is to develop a method by which subjective appraisals of discomfort can be predicted from certain pertinent physical characteristics of the environment. It is generally agreed that the fundamental factors which influence discomfort due to brightness include

1. The brightness of the source or luminous area.
2. The visual size of the source.
3. The brightness level to which the eyes are adapted.

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4. The position of the source with respect to the normal line of sight.

Other factors such as the number of sources in the field of view, criticalness of the visual task, color of light, etc., either modify the basic ones or have been found to be of second order importance. Most fundamental investigations have been in terms of a single source in the visual field. While this is not typical of lighting practice, data on single sources do provide information regarding the relationships among these fundamental factors. These data, of course, must be supplemented by investigations involving multiple sources in the visual field.

BASIC RELATIONSHIPS

In all investigations of discomfort glare, subjective evaluations have been made in terms of a given sensation. For example, observers have been required to adjust the brightness of the glare source until it produced a sensation at the borderline between comfort and discomfort. This is termed the BCD sensation.[1] The general relationship between source brightness and the solid angle subtended by the source based upon the combined data of a number of investigators[2, 3, 4, 5, 6, 7] is shown in Figure 1. This curve is for a source located on the line of sight and a uniform field (adaptation) brightness of 10 footlamberts. It is seen

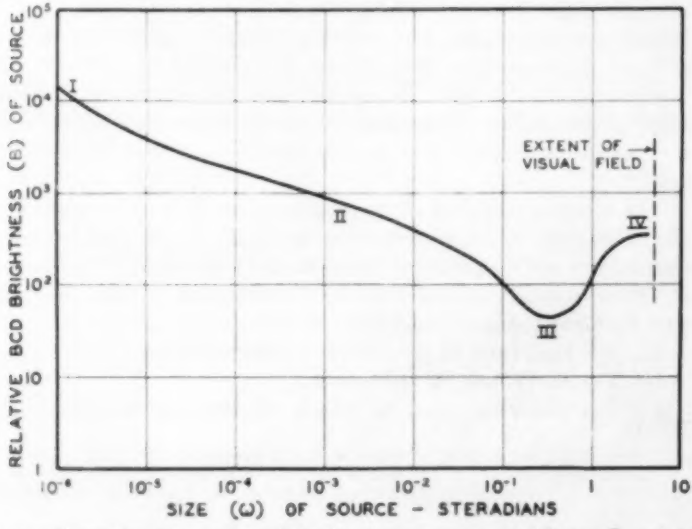

Fig. 1. Illustrating the general relationship between source brightness B and solid angle ω for a sensation at the borderline between comfort and discomfort (BCD).

that the relationship is relatively complex and that the size of the glare source has a varying effect upon the brightness which is judged to be BCD by the "average" observer. For very small sources subtending solid angles less than about 10^{-4} steradian (Region I), the curve slopes upward and ultimately would follow Ricco's Law (area times brightness equals a constant). The middle region (II), extending from about 10^{-4} to 10^{-1} steradian, includes an approximately linear logarithmic portion plus a range of source sizes where area becomes increasingly more important as is indicated by the downward slope. At III the curve reaches a minimum and turns upward, indicating that the source is contributing increasingly to the adaptation or field brightness. In the region of IV, at about five steradians, when the entire visual field is filled by the source, the curve levels off to a finite value of brightness.

When surrounding field brightness is increased or the source is displaced from the line of sight, the permissible BCD brightness may be increased. For example, by increasing field brightness from 10 to 50 footlamberts or moving the source 20 degrees above the line of sight the BCD brightness may be approximately doubled. Experimental data have shown[4] that for a considerable range of the fundamental factors, the fundamental relationships can be represented by a family of parallel curves. This range includes field brightness from about 1 to over 100 footlamberts and source sizes less than about 0.15 steradian. It is obvious that parallelism cannot exist for source sizes greater than this value. Regardless of the surrounding field brightness, when the source is so large that it occupies the entire visual field—or nearly so—the source brightness itself is the determining factor. Field and source brightnesses become identical. Thus, all curves must come together at IV in Figure 1. Fortunately, the region from about 10^{-4} to slightly more than 10^{-1} steradian has been found to include the range of sizes important in practical interior lighting situations.

The relationship shown in Figure 1 can be represented by an equation of the type

$$B = MP \frac{f(F)}{f(\omega)} \qquad (1)$$

in which the BCD brightness B of the source is expressed in terms of a constant M, a position index P, and functions of the field brightness F and solid angle ω subtended by the source. It is obvious that an expression for the complete curve would be exceedingly complex. However, any portion of the curve of Figure 1 which approximates

a straight line can be represented by

$$B = \frac{MPF^a}{\omega^b} \qquad (2)$$

This is a type of glare formula which has been derived by some of those who have studied a relatively limited range of source sizes. Thus, for the approximately linear portion from about 10^{-4} to 5×10^{-2} steradian, the relationship can be represented by

$$B = \frac{MPF^{0.44}}{\omega^{0.30}} \qquad (3)$$

Similarly, for sizes of sources in the region of 10^{-1} steradian, the exponent of solid angle ω becomes unity and the formula is

$$B = \frac{MPF^{0.44}}{\omega} \qquad (4)$$

However, the entire practical range from 10^{-4} to 0.13 steradian requires a somewhat more complicated formula:

$$B = MPF^{0.44} (\omega^{-0.21} - 1.28) \qquad (5)$$

For the BCD sensation, M is equal to 108. The expression for solid angle ω within the parentheses is required to account for the increasing effect of solid angle for the region where the curve of Figure 1 turns downward.

It is evident that the simpler formulas (3) and (4) will result in source brightness higher than those found permissible by actual subjective appraisals if they are used for sizes of sources outside the approximately linear portions of Figure 1 which they represent. For example, extrapolating formula (3) to 10^{-1} steradian results in a brightness about twice that which was subjectively determined to produce the BCD sensation. On the same basis, formula (4) would lead to higher than permissible BCD brightnesses for small solid angles. Experience has indicated that a relationship among the basic factors as expressed by formula (5) is necessary to encompass the range of environmental conditions encountered in practical situations.

MULTIPLE SOURCES

The next step in discomfort glare investigations is to devise a method for dealing with groups of sources which correspond to those encountered in typical lighting practice. These may range from a few relatively small sources to extensive luminous areas. The ultimate requirement of such a method is that computed ratings should agree with experimentally determined subjective ratings.

It is evident that an investigation of all possible combinations of multiple sources would be a monumental task. Therefore, the usual procedure is to start with the glare formula for a single source and then devise a suitable means for applying it to groups of sources. Formula (5) can be rewritten as

$$M = \frac{B}{PF^{0.44}\,(\omega^{-0.21} - 1.28)} \qquad (6)$$

in which M now is considered as an *index of sensation* or glare factor. When the combination of source brightness B, position index P, field brightness F and solid angle ω are such that the sensation is at the borderline between comfort and discomfort (BCD), M is equal to 108. Lower and higher values of M indicate less or greater discomfort.

It is emphasized that M is merely a numerical indicator of relative discomfort and not necessarily a measure of the sensation. Nevertheless, since it is based upon experimental subjective evaluations it should be relatable to the sensation but probably in a very complex way.

When dealing with several sources, a suggested procedure has been to sum up the computed glare factors of the individual sources

$$M_t = m_1 + m_2 \ldots\ldots m_n \qquad (7)$$

and consider that M_t provides a glare rating of the entire group. The principal drawback to this procedure is that the computed index of sensation M_t of a group of sources invariably has indicated greater discomfort than was found by subjective evaluations. In other words, glare effects in terms of indices of sensation are not directly additive. Such non-additivity is not unexpected since this is a characteristic of many other psychological and psychophysical phenomena. It has been suggested[3] that this provides a "factor of safety." However, the discrepancy between computed and experimentally determined values seems to depend to a great extent upon the number of sources involved. This sometimes can be very important, especially when an arbitrary decision needs to be made regarding how to subdivide a large luminous area into smaller elements.

EXPERIMENTAL CONDITIONS

The considerable data which are available[1, 8, 9, 10] for a wide variety of experimental conditions include a number of combinations of groups of sources. However, additional information was needed to explore several possible methods for dealing with multiple sources. Therefore, an experimental arrangement was devised which would include certain fundamental characteristics of typical visual environments plus complete control of environmental brightnesses. Since this is difficult to

Fig. 2. A view of the experimental condition which simulates a luminous ceiling. The comparison source is located on the line of sight.

achieve in an actual room, it was decided to use a visual environment in which actual conditions could be simulated.

The arrangement employed in the present investigation is illustrated in Figure 2 and corresponds to a room 34 feet long by 20 feet wide with a luminous ceiling mounted 9 feet above the floor. The physical details of this room were projected upon a vertical plane normal to the horizontal line of sight 3 feet from the eyes. The luminous ceiling was assumed to consist of 63 elements, each 2 feet by 4 feet in size, arranged in nine lengthwise rows as shown in Figure 3. The observers were located at the point marked "X." For simplicity of control, the entire ceiling area was of uniform brightness. Also shown in Figure 3 is the average limit of the visual field on the ceiling for the group of observers. Only that portion which could be seen was included in comparisons and computations.

The ceiling area was so constructed that white panels could be inserted to cover any portion of the luminous region. Thus, evaluations could be made of the entire ceiling or any desired part of it. In the present investigation this variable was confined to various combinations of lengthwise rows.

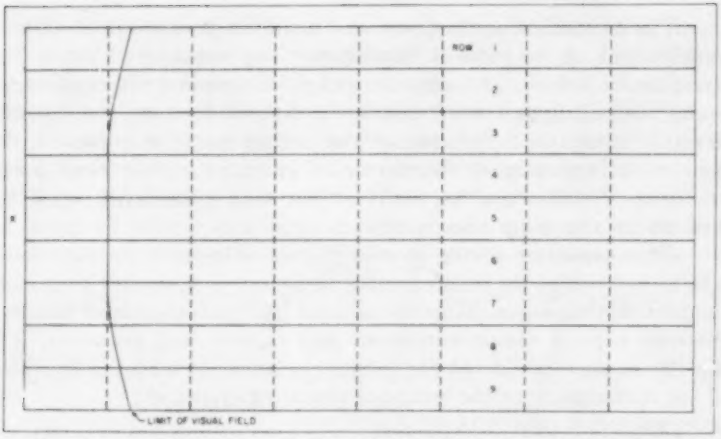

Fig. 3. A plan view of the room which is simulated by the experimental conditions. The observer was considered to be located at the position marked "X". The curved line near the observer represents the average limit of the visual field on the ceiling for the group of observers.

The reflectances of the floor, walls and non-luminous portions of the ceiling were 30, 50 and 80 per cent, respectively. The illumination of these areas was controlled independently from that of the luminous portion of the ceiling by lamps located above and to either side of, and completely shielded from, the observers. For purposes of comparison and computation, the wall brightness was considered to be the field brightness F. The validity of doing this has been checked experimentally.[11] In this investigation the wall and ceiling brightnesses were maintained at 20 and 300 footlamberts, respectively.

EXPERIMENTAL PROCEDURE

Using the momentary exposure technique[1] two types of evaluations were made by a group of 12 observers: BCD and comparisons. Both involved the use of the Discomfort Glare Evaluator[10] which was developed for this type of experimental situation.

When making BCD evaluations, the observers adjusted the brightness of the circular test source (Figure 2), located on the line of sight, until it produced a sensation at the borderline between comfort and discomfort. During these evaluations the moveable shield of the Discomfort Glare Evaluator was in the down position. This prevented the luminous ceiling area from being seen by the observers. The brightness of the shield was approximately the same as that of the wall. BCD evaluations were made during every experimental session and so provided a continuous check on the observers.

The comparison method was used to obtain evaluations of various combinations of the rows of luminous ceiling elements. That is, the source on the line of sight—now termed the comparison source (Comp)—and the ceiling area were alternately exposed to view and the observer adjusted the brightnss of the former until it produced the same visual sensation as the particular group of ceiling rows being evaluated. At all times the observers kept their eyes fixated upon the position of the comparison source.

This procedure results in a brightness of a small circular source which, in terms of the induced visual sensation, is equivalent to a more complex luminous area. Since the original BCD investigations[1] involved the same type of comparison source and experimental procedure, it is possible to use formula (6) for computing indices of sensation regardless of the characteristic of the luminous area being evaluated.

EXPERIMENTAL RESULTS

Ten different combinations of lengthwise rows were evaluated. The various experimental conditions are listed in the first column of Table I. The luminous areas ranged from the full luminous ceiling down to single rows of elements. The total solid angles $\Sigma\omega$, subtended by the various combinations within the average field of view of the group of observers are shown in the second column. The mean values of the brightness of the comparison source B_c which the observers judged to produce the same visual sensation as the indicated arrangement of lengthwise rows are presented in the third column.

As would be expected, these comparison source brightnesses generally decrease as the solid angle of the luminous area decreases. However, it will be noted that B_c for condition H is greater than those found for Conditions F and G, even though the solid angle subtended by the former is less. This indicates the contribution of the position index P in formula (6). The elements included in Condition H are located directly forward from the observer, whereas those of Condition F and G are located considerably more to the side.

Relative subjective ratings can be computed in terms of the ratio of the comparison source brightness to the BCD brightness of the source on the line of sight, i.e., Comp/BCD. The average BCD brightness of the test source for a wall brightness of 20 footlamberts, was found to be 1480 footlamberts. The ratios Comp/BCD for the ten experimental conditions are shown in the fourth column of Table I. From these, it is seen that Condition B was judged to produce a sensation at the borderline between comfort and discomfort.

Another way of expressing the subject evaluations is in terms of the index of sensation M_c of the comparison source. These values were computed by means of formula (6). In the case of the comparison source, $P = 1$, $\omega = 0.0011$, $F = 20$ and B corresponds to B_c. Values of the index of sensation M_c are presented in the last column of Table I. It will be noted that B_c and M_c are directly proportional because of the linear relationship between these factors in formula (6). Both are presented because each lends itself to certain types of comparisons.

TABLE I.

Solid angles and subjective evaluations of the ten experimental conditions. The average BCD brightness is 1480 footlamberts.

	Experimental Condition	Luminous Area	Comparison Source Brightness	Subjective Rating	Index of Sensation for B_c
	Rows	$\Sigma\omega$ (Ster)	B_c (fL)	Comp/BCD	M_c
A.	All	0.764	1680	1.14	155
B.	1-3-5-7-9	0.403	1475	1.00	136
C.	2-4-6-8	0.361	1403	0.95	129
D.	1-5-9	0.220	1194	0.81	110
E.	4-6	0.221	1213	0.82	112
F.	3-7	0.183	964	0.65	89
G.	2-8	0.140	881	0.60	81
H.	5	0.118	980	0.66	90
I.	3	0.0915	825	0.56	76
J.	1	0.0513	663	0.45	61

ANALYSES AND COMPARISONS

The data shown in Table I offer some interesting opportunities for developing methods for computing discomfort glare ratings for these experimental conditions. As has been pointed out, computed ratings based upon certain physical characteristics of the sources should be relatable to subjective evaluations. Agreement can be indicated by correspondence of the relative order of discomfort produced by the various experimental conditions, or preferably, by a direct relationship between computed and observed values. It is emphasized that the comparison source brightnesses (B_c), the subjective ratings (Comp/BCD) and the indices of sensation (M_c) are not measures of glare sensation nor do they, by themselves, tell us whether one experimental condition is twice as glaring as another. However, they do represent subjective evaluations of *relative discomfort* to which computed ratings should be relatable.

A number of methods have been suggested for computing discomfort ratings. They have been applied to practical situations with varying degrees of success. For example, in some cases it was found that unduly high discomfort ratings seemed to be caused by the large num-

ber of luminaires, even when their brightnesses were not excessive. In others, especially luminous ceilings, the number of elements into which the ceiling was arbitrarily divided seemed to introduce an uncontrollable variable. Practical lighting installations may involve a wide range of sizes and numbers of luminaires and total luminous areas. Therefore, in order for any method to be universally applicable such things must be taken into consideration.

All discomfort glare investigations have emphasized the non-additivity of glare effects. That is, computed evaluations involving two or more sources have indicated greater discomfort than is shown by experimental observations. That additivity probably is a complex function is illustrated by the values of Comp/BCD and M_e of Table I. For example, the relative rating of Condition B is 1.0, which is average BCD. This particular combination of elements is made up of conditions D and F, for which the relative ratings are 0.81 and 0.65, respectively. On a purely sensation basis it can be said that B is equal to D plus F. However, the sum of the ratings Comp/BCD of the latter two conditions is considerably greater than the rating for Condition B.

Computed discomfort glare ratings are derived from the physical characteristics of the sources. That is, values of brightness, size and position of the source and the field brightness substituted in formula (6) will yield an index of sensation or glare factor M for that particular source. The sum of these individual ratings provides a numerical assessment of the discomfort produced by the entire group of sources. It is this value (ΣM) which should be relatable to the subjectively determined evaluation.

The sum of the indices of sensation (ΣM) for a group of sources invariably is higher than the experimentally determined index for a

TABLE II.

Computed discomfort glare ratings using the exponential method.

Experimental Condition	Experimental Index of Sensation M_e	Sum of Indices of Sensation ΣM	Number of Elements n	Variable Exponent (from curve) a	Computed Index of Sensation $(\Sigma M)^a$
A.	155	1606	63	0.68	152
B.	136	865	35	0.72	130
C.	129	741	28	0.74	133
D.	110	485	21	0.76	110
E.	112	410	14	0.78	109
F.	89	379	14	0.78	103
G.	81	331	14	0.78	92
H.	90	198	7	0.83	81
I.	76	190	7	0.83	78
J.	61	144	7	0.83	62

single equivalent source. This is illustrated by a comparison of the values in the second and third column of Table II. An analysis of these discrepancies indicate that they appear to be a function of the number of elements into which the luminous area has been subdivided. As the number of elements decreases, the ratio of ΣM to M_c becomes smaller. Obviously, when a single source is involved—as was the case in the original BCD investigation—this ratio becomes unity.

In order to explore the possibility of ΣM being exponentially related to M_c in terms of the number of elements involved, Figure 4 has been prepared. Values of a variable exponent "a" were computed from

$$(\Sigma M)^a = M_c \qquad (8)$$

and plotted against the number of elements "n." Figure 4 illustrates that a linear logarithmic relationship can be established between the exponent "a" and number of elements "n." Using exponents obtained from Figure 4, values of $(\Sigma M)^a$ have been computed and are shown in Table II. The average difference between computed and experimental ratings is about 5 per cent. Of greater significance is that there is no systematic difference due to the number of elements involved.

In methods of dealing with groups of sources which have been tried previously, it was found that the way a large source was arbitrarily subdivided influenced the computed rating. In order to determine whether this had any effect upon the exponential method, the full luminous ceiling was subdivided in several different ways. The only stipulation was that the ratio of the length to the width of the

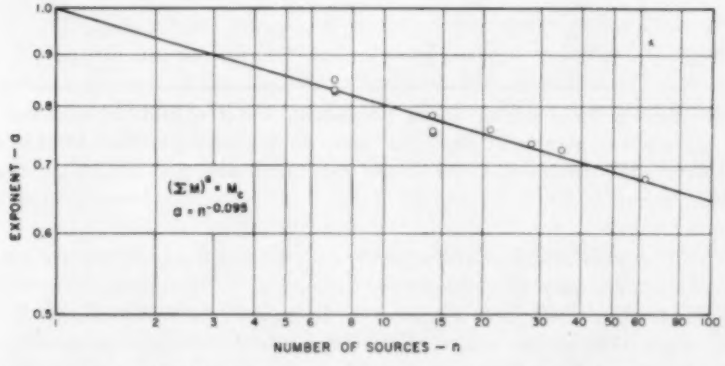

Fig. 4. The relationship between exponent "a" and number of sources "n" of luminous elements included in a group being evaluated. The variable exponent provides a method for relating the sum of the indices of sensation (ΣM) to the experimentally determined subjective evaluation.

projected area of an element should not exceed 4. Previous investigations[1, 3] have shown that linear sources having a length to width ratio no greater than 4 could be considered as concentrated sources. Thus, for example, several groups of nine elements were considered as single units and new values of ΣM were computed. In this case, the total number of elements was 39 and the exponent "a" from Figure 4 is 0.715. The summation of M for this number of elements is equal to 1154 and the final value of $(\Sigma M)^a$ equals 155. This is identical to the experimentally determined value of M_c. Other groupings of individual elements resulted in similar good agreement. This indicates that the variable exponential method has the important advantage of taking into consideration the arbitrary division of a large luminous area into smaller elements.

Recently Allphin[12] has obtained BCD data using a large group of observers and a lighting system corresponding to that used in typical offices. The observers adjusted the brightness of the luminaires until a sensation at the borderline between comfort and discomfort was induced. Using formulas (6) and (8) it is easy to predict what the luminaire brightness should be for the BCD sensation. The observed and predicted values of luminaire brightness are shown in Table III.

TABLE III.

Comparison of observed BCD brightnesses from the Allphin data with those predicted by the exponential method.

Experimental Condition	Number of Luminaires	BCD Brightness	
		Observed	Predicted
1.	1	680	705
2.	2	540	490
3	2	500	520
4.	4	410	365
5	4	410	365
6.	12	255	250

The average difference of about 7 per cent is not considered excessive. The excellent agreement indicates that, on the average, Mr. Allphin's observers are similar to those whose data were used for developing the BCD formula.

CONCLUSION

This new exponential method for computing discomfort glare ratings offers considerable promise and appears to be far superior to other methods which have been proposed[12]. It is particularly significant that its application to the results of an independent investigation provided excellent agreement between observed and predicted luminaire brightnesses. Needless to say, additional information is required for a wide variety of environmental conditions to assure that this new method can

be applied generally. Another important need is to assign some meaning to the numerical glare ratings. Work is progressing and it is hoped that these problems and other questions will be answered in the not-too-distant future.

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PHEIFFER NEW DEAN AT HOUSTON

Dr. Chester H. Pheiffer, professor of optometry at the University of Houston, has been named Dean of the University's College of Optometry, according to Dr. Philip G. Hoffman, Vice President and Dean of Faculties. Dr. Pheiffer will replace Dr. Charles R. Stewart who resigned to enter private practice in Waco.

Dr. Pheiffer joined the University of Houston faculty in 1954. He holds an A.B. from the University of Louisville, an M.A. and Ph.D. from Ohio State University, and an O.D. from the Southern College of Optometry. The author of many articles in optometric journals, Dr. Pheiffer is a member of the American Academy of Optometry, the Texas Academy of Optometry, the Southwest Visual Forum and the Southwestern Contact Lens Congress. He is a consultant for the National Board of Examiners in Optometry. Dr. Pheiffer will assume his duties as dean on June 1.

OPTOMETRY AND THE SLOW DIFFUSION OF KNOWLEDGE*

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I am deeply appreciative of this honor from the American Academy of Optometry for reasons that have little to do with me and much to do with the nature of the Academy, reasons which I hope to make clear before the evening is over.

The eye early attracted man's attention, imagination and an uncertain measure of fear and awe. We have only to think of mythology as, for example, that Odin traded one eye for universal knowledge or of the superstition of the evil eye. This interest has continued to the present time, a period, if we count from Aristotle, of two and a quarter millenia. The eye not only attracted the attention but often the major energies of many of the greatest minds of this period. Here we encounter a curious dichotomy. This attention developed on the one hand into sound knowledge becoming clearer with time, but on the other hand into mythology declining in poetic value but maintaining or perhaps increasing its separation from reality in proportion as that reality became more extensive and complex. A hasty and sweeping survey of the ages will make this confusingly clear.

It is to me a fascinating story—an epitome equally of science and of nonsense. The knowledge has of necessity reflected the Zeitgeist of each age and utilized the new techniques as they appeared so its story is in a very real sense a history of science. The nonsense represents an accretion on the primitive mythology of the foibles of each age, in part, I suspect, a reaction against the effort of understanding an ever more complex and difficult world. So you see I really have nothing new to say—it's all in the books. I wish only to draw it out into the light of day and marshall it in such a manner as to make clear the important lesson that it carries for the optometry of today.

The gross structure of the eye was known to Aristotle by 300 B.C. and by the time of Rufos and Galen we find most of the names we

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now use, some Latin and some Greek, for Galen wrote in both. We thus have *cornea* from Latin, *cornu*, meaning horn and keratometer, keratitis, keratoconus and the like from Green *keras* (keratos) also meaning horn; choroid and arachnoid (Greek) and retina and uvea (Latin). The names of the structures sound familiar, but if we turn to the physiology of the eye it is all very strange. A clear idea of the fundamental fact of an image in the eye had to wait about 1400 years until Kepler (1604 and 1610). True, the Greek philosophers had talked of "images," but these were "species" or forms which left the objects, came to the eye, were reduced in size in some mysterious manner so that they might pass through the tiny pupil and furnish the eye with a "model" of the object "seen."

Lenses, too, were ground before Kepler's time although they were not understood. Marco Polo saw them in China in 1270 and there are rather vague claims for their use as spectacles in the early 1300's and quite clear references by 1350. Lenses were made by upstart artisans, the lens grinders, and were scorned by philosophers. Leonardo struggled with the problem of image formation but what he accomplished lay hidden in his notebooks and had no influence on the optics of his time. Before Leonardo, Alhazen, in the height of Arab culture (about 1000), made a major contribution to vision. While some Greeks had thought of "species" as coming from the object to the eye, others considered that "rays" from the eyes explored the objects in space perhaps in some such a manner as a blind man uses a cane. Alhazen presented a surprisingly clear idea of rays coming to the eye and even how an image might be formed by a lens but was unwilling to follow this to the logical conclusion of an image in the "bottom" of the eye because it would have been "upside down"—an obvious absurdity!! Some 960 years later this problem still worries certain kindred minds. Alhazen therefore followed some of the ancients, including Galen, in locating the "image" on the front surface of the crystalline lens, before the rays had crossed.

We are thus clearly justified in saying that there was a lag, a rather long lag of some 1400 years, between the identification of the gross structures of the eye and furnishing these structures with an image.

It is clear that a satisfactory idea of refraction by which the shortcomings of the eye as an optical instrument are supplemented by glass image formers, had to await knowledge of how images are formed and the fact that images are formed in the eye. This knowledge was necessary, but not sufficient, and many years were to pass before what appears

to us as the obvious application was made to the eye by the intelligent use of spectacles. Kepler stated first how images are formed in general (1606) and in the eye in particular (1610), and at almost exactly the same time (1609) Scheiner demonstrated the image in the eye of animals and later (1625) in man.

What was the lag in the application of this knowledge in founding scientific refraction? We can fix the time with unusual accuracy: it is 254 years. But before developing this point as it deserves, let me call your surprised attention to an even longer lag. Three hundred and forty-two years after Kepler and Scheiner a book was published in the United States* in which we read, "various facts of vision strongly suggest that the notion [of the alleged image-on-the-retina] is pure myth." These authors did not invent but only adopted this attitude: other persons doubt that an image really exists in the eye. A lag of over three centuries is a serious indictment of the art of human communication. Even the Christian Scientist who claims that the bacteriologist generates the bacteria by looking through the microscope represents a lag of only one third as long, since Pasteur convincingly demonstrated bacteria a mere century ago.

But to return to the dating of the science of refraction. Thomas Young in 1801 published a brilliant analysis of accommodation and other visual phenomena, and Purkinje in 1823 described the reflected images of the eye and other visual observations. These brilliant discoveries, however, had little influence upon the application of optical principles to the eye. In 1864, 96 years ago, Donders published "The accommodation and refraction of the eye," an international event presenting to the world the work of a Hollander in English. Slightly earlier Helmholtz began and somewhat later completed his "Physiological Optics," so this one date may well serve for both. The time was ripe and these two men, with von Graefe in Germany and Bowman in England, placed refraction on a scientific basis. Before this, what we now know as refraction was only confusion, afterwards there was merely elaboration. From the placing of the image in the eye by Kepler to its control, 254 years had elapsed.

In general some lag in human affairs is to be expected. Repeated verification is the basis of stability in science. It takes time for discoveries to diffuse and be applied, for students to be trained and enter practice. But when all allowances are made, 254 years is a very long time.

*Snyder, F. W., and N. H. Pronko, Vision with Spatial Inversion. Wichita, Kans., University of Wichita Press, 1952.

Many discoveries were made in these 254 years and many outlooks changed, but not rapidly. Time does not permit even sketching these, but another instance of lag may be illustrated. In 1802 Paley, an English divine, brought out his celebrated "Natural Theology" embodying the famous "argument from design." The book was widely used as a text in "Natural Philosophy" and went through many printings, as the worn plates of the 1854 American version clearly show. The eye furnished one of the best examples of design and, in consequence, occupies a prominent place in the book. It is written in the balanced English of the time and expresses in many passages some of that genuine wonder at natural phenomena often missing from the writing of today. Time forbids the numerous quotations that come to mind, but the lag must be illustrated. "Whenever the eye is directed to a near object, three changes are produced in it at the same time, all severally contributing to the adjustment required. The cornea, or outermost coat of the eye, is rendered more round and prominent: the crystalline lens underneath is pushed forward: and the axis of vision, as the depth of the eye is called, is elongated. These changes in the eye vary its power over the rays of light in such a manner and degree as to produce exactly the effect which is wanted . . ." to focus on the near object.

As stated, in 1801, just before the Natural Theology appeared, Thomas Young had examined each element of this triple threat to accommodation and had shown ingeniously and conclusively that none of the three was a factor for accommodation in the human eye although the lens is now known to move in the eyes of certain fish. In the half century before this edition appeared, some echo of the paper in the Royal Society might have reached one of the revisers (Paley died in 1805), since the real mechanism is not less a remarkable example of design than those erroneously given. For example, Young's work was recognized by Charles Bell in the 1812 edition of his Anatomy.

I must turn aside from this history of science to bring this rambling but, I hope, not pointless talk to a close. I would say a word for a more critical approach in these meetings, for shorter or fewer papers and more discussion, for an alert and judicious attitude toward hypotheses and interpretations, because truth is very important, but a very tolerant attitude toward the men who present them. To paraphrase Huxley, let us turn from the unimportant question of who is right and who is wrong to the very important question of what is right and what is wrong.

The pageant of the unfolding knowledge of the eye, stretching

over more than two millenia and entombed in hundreds of dusty volumes, is an impressive record of human endeavor. It is indeed an epitome of the history of science since each new technic developed by science has been applied to the study of the eye so that the progress of science can be traced in the development of the knowledge of the eye. You can see the process in operation today when the electron microscope, the methods of electrophysiology and of biochemistry are bringing a new harvest of knowledge about the eye.

Paralleling this story is another, also characteristic of human culture, but far less to the credit of man. Some lag between the advancing front of science and its sure application to man's welfare seems inevitable and, it has been argued, desirable. New discoveries must be validated by tedious repetition. Long-term experience may tell a story different from that of the acute experiment—witness the story of dinitrophenol and cataract. New knowledge must be integrated into the already existing body of information and the current outlook.

But any man or woman deprived of health or incapacitated for lack of application of known facts is a rebuke to mankind. I appreciate an honor from this society because this society is based on the ideal of service, which consists, in brief, of applying to all patients the soundest and best knowledge with the least lag. It supports the gaining of knowledge through research, its diffusion through meetings such as these and through the journal which it supports, its understanding through discussion and its application promptly and effectively to all men and women whose vision is less useful than it might be.

This program of the society forms a whole, neither research, communication nor application can be neglected without impairing its usefulness. Only a true profession sees its mission as a meaningful whole and in terms of service. Cultism, in which emotion and resistance fill the void which knowledge should occupy, commercialism with its overemphasis on the money that may be made in applying knowledge, timorous conservatism which fears to use any method unknown to its youth, faddism which feels that the newest is the best, all these lengthen the gap between sound knowledge and its wise application. Let us not have on our professional conscience those time-consuming lags which deprive men and women, perhaps for their entire lifetime, of that share of human culture which is their birthright.

HOW TO PREPARE CONTACT LENSES FOR USE ON THE EYE*

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A common problem in the wearing of contact lenses, especially during the initial training period, is the excessive lacrimation, blinking, and discomfort upon placing the lens on the eye. In most cases these symptoms diminish after a few minutes, but the procedure often leaves the eyes inflamed and irritated and causes a loss of patient morale. This distress significantly interferes with their overall wearability.

For years this phenomenon has been accepted as the natural reaction of the eye to a foreign body, worse with some people, but to be expected to a certain extent in most cases. However, it is the opinion of the authors that, except with gross lens imperfections, these symptoms are mainly caused by irritating contaminants on the lenses. Perhaps they are not easily observed, but they are present nevertheless.

This unhappy situation has been demonstrated to many contact lens patients by close study of the wetted lenses which produce these symptoms and subsequently by making sure that the lenses which enter the eye are truly clean. Almost invariably the symptoms are eliminated by using meticulously prepared lenses.

In considering "clean" contact lenses, it must be understood that they will not be perfect from a microbiological viewpoint. They will not be aseptic, but every aspect of lens handling is directed toward making them as free as possible from bacterial, fungal and viral pathogens.

A lens will be accepted as "clean" if it carries no substances which are irritating to the eye. Therefore, an effective cleaning agent used on the lenses must remove all the irritants and not be painful by itself; and thus far, every one of the contact lens wetting solutions used by the authors fulfill these requirements. Wetting solutions are becoming more complex but usually they contain:**

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**Information concerning wetting solution components was obtained from Mr. Clarence Schreur, Pacific Research Laboratories, Escondido, California.

(1) Benzalkonium Chloride (a quarternary ammonium compound), which is a germicide. Unfortunately, it is also a surfactant or film spreading agent.
(2) A film-forming agent. Examples are methyl cellulose, polyvynalpyroladone K90, sodium alginate and gelatin.
(3) Dye.
(4) Occasionally, perfume.
(5) Distilled water.

Then, why do symptoms occur when efficient wetting solutions are used prior to placing a lens? Because the solutions are not always used properly. They may not be applied abundantly enough, or they may be washed away before the lens is inserted. But more often, the fingers transfer irritants to the lens while it is in preparation.

Correctly soaked or carefully dried lenses can rarely carry enough "dirt" to disturb the conjunctiva and cornea after the offending substances have been diluted by clean wetting solution adherent to the fingers. The primary consideration then is the cleaning of one's fingers, not the lens. Maximum hydration of the lenses has been recommended for several reasons but this process does not obviate the need for cleaning the surfaces of one's fingers which touch the lenses.

Any irritants on the fingers, which are soluble in the wetting solution, can be removed by it and must be removed.

Non-ionic soaps are available and well recommended for the thorough cleaning of one's hands, but special soaps add to the paraphernalia required for lens use. Also, in an emergency, a water supply may be unavailable—hence the reliance on wetting solution alone.

In order to insure that the wetting solution is used effectively and cleans the fingers and the lens, at least in the beginning of training, it has been found wise to follow dogmatically a series of actions. These are as follows:

1. Expose the lenses to be used so that later they can be touched and picked up by one's wet fingers of the right hand.

2. Depending upon the viscosity of the wetting solution, apply 4 to 6 drops on only the inner surfaces of the third phalanges of the thumb and first two fingers of the right hand. The tips of the fingers must be held pointing down. Then any excess will not wet the rest of the hand.

3. Rub the wet surfaces briefly—just enough to begin to dislodge accumulated oil, perspiration, fibers, grit, etc. If this rubbing is prolonged, evaporation of water will increase the viscosity of the solution so that it, and the foreign substances in it, will not be removable.

4. Remove all traces of the solution by vigorously rubbing the cleansed finger tips on a cotton or paper towel, or on a clean handkerchief carried for this purpose. The fingers must be made absolutely dry.

5. Fibers or lint are removed by running the fingers over the surface of one's clothes, whatever the material. Lint and fibers will be left adherent to the cloth, not to the fingers.

6. Again apply 4 to 6 drops of solution on the third phalanges of the thumb and first two fingers. Quickly spread it over the surfaces previously cleaned.

7. Touch the lens to be placed in order to pick it up. Rub it between the fingers for several seconds to spread the solution upon it.

8. Position the lens between the wet fingers so that the inner and outer surfaces can be observed, if the visual acuity permits. In early training, while clean habits are being learned, spectacles are usually available for this inspection. The lens should appear transparent and "filmy." If there are any foreign substances in the solution, the lens will appear translucent or "milky." And it may show small fibers if the fingers were not cleaned well. In that case, proceed with the next step.

9. Grasp the lens with the thumb and first finger of the left hand. Place the lens on a clean, flat surface whereon it will be easily located. Add a few drops of additional solution to the thumb and two fingers of the right hand and repeat steps 2 to 8; that is, re-clean one's fingers.

It is useless to try to rid the lens of contaminants by just cleaning it alone. Rarely can it carry, by itself, enough foreign matter to make it unacceptable. Small quantities of unwanted substances are quickly and effectively diluted by the wetting solution on the fingers.

Interrupting this entire procedure to wash one's hands will not assure a clean lens since residual soap components (free alkali, filler, dye, perfume, and calcium and magnesium salts of the fatty acids in soap) may remain on the fingers. Subsequently, the soap components are dissolved in the wetting solution and the lens will appear cloudy once again. To continue the process, repeat step 9.

10. With the thumb and first finger of the left hand, the edges of the lens may be touched lightly to situate it upon the tip of the wet first finger of the right hand. Then it is ready to place.

11. For speedy and simple handling of the lens, the thumb and first finger of the left hand are used to steady the eyelids. Only the right hand touches the lens—with the single exception noted in step 10.

12. Immediately upon placing the first lens, the second lens is

touched with the clean and properly wetted first finger of the right hand. Rub it briefly, just long enough to press the solution upon the surfaces. Inspect it and place it. Do not add solution. Do not attempt to re-clean the fingers. No further action is needed provided that the right hand touches nothing which would contaminate the clean solution. In the interest of being obliged to clean only those areas absolutely necessary—use the fingers of the right hand to wet both lenses. Use the dry fingers of the left hand to steady the eyelids of both eyes.

Is this a lengthy procedure? With practice, it can be completed in 30 seconds. Can one use any commercial wetting solution? Almost none of the available solutions has a viscosity that is too high for use. Any solution requiring the addition of water to reduce its viscosity is not acceptable for this technique. And no solution which is deemed an irritant should ever be placed on the cornea. Being forced to wash a solution from a lens is ipso facto a contraindication for the use of that solution.

CONCLUSION

Gradually, whether he is conscious of it or not, each contact lens patient will establish his own minimum acceptable requirements for cleanliness. How many drops will be needed of the particular solution being used? How much pressure should be applied when cleaning the finger tips in a clean towel? If the occupation is one in which there is apt to be much contamination, will it be necessary to repeat the process of cleaning the fingertips? These and other questions are answered by trial and error over a period of months, but first the expert doctor gives the novice patient a system which allows him to use wetting solution—not saliva—with ease.

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A TYPICAL ARMY OCCUPATIONAL VISION PROGRAM*

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The Army employs several hundred thousand civilians, in addition to maintaining its own military strength, at installations located throughout the world. At each of these the Army Medical Service provides an occupational health service conforming essentially to a public law passed by Congress in 1946 which authorized departments of the Federal Government to furnish certain limited types of health services to its employees. These are: a) treatments of on-the-job illness requiring emergency attention, b) preplacement or other examinations, c) referral of employees to private doctors, and d) preventive programs relating to health.

The United States Army Environmental Hygiene Agency, operating directly under the Office of the Surgeon General, provides consultation on special health problems and performs surveys to determine special health hazards that exist at these installations. These surveys are of problems relating to radiation hazards, noise hazards, toxicology, entomology, sanitary engineering, industrial ventilation, and detection and control of other occupational health hazards requiring specialized equipment and techniques not available locally to the individual installations. In addition, this Agency has an Occupational Vision Branch staffed with Medical Service Corps optometrists. Vision programs were begun about 1946 and since that time 120 of these have been put into operation throughout continental United States and Alaska. The manner in which these programs are initiated and maintained will be described.

To appreciate the role of the occupational vision program in a large Army industrial installation, it is important to recognize major accomplishments in the field of eye safety, largely the result of the efforts of well organized safety programs, which have been in effect in the Army since early in World War II.

For example, in the ARMY ORDNANCE SAFETY DIGEST for August,

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1959, a comparison is made between disabling eye injuries per man hour of exposure during a 3-month period in 1941 and a similar period in 1958. This showed that the biggest improvement in the entire Ordnance safety program was in the area of eye safety. Eye injuries were down 97.2 per cent. How many of us are aware of the staggering cost to the Government of eye losses? Studies indicate that monetary cost to the Government in the case of an employee who loses one eye averages between $20,000 and $30,000, while if the loss is bilateral this may amount to as much as $300,000 in medical costs and disability compensation payments. These figures are staggering, considering that there are approximately 324 eyes saved per year in Army installations, cracked safety glasses serving as mute testimonials. As impressive as the figures are, they do not over-shadow the fact that 324 Americans continue to enjoy the precious gift of sight. These are benefits which, as already pointed out, accrue largely from the application of well conceived and organized safety programs.

What contributions then can be made by the health services of the installation in the field of occupational vision within the limitations imposed by the public law? These lie in the promotion of such activities as: a. analysis of jobs for vision requirements, b. special vision testing of all personnel to determine their visual abilities and defects, c. refracting and prescribing for the correction of vision defects on a referral basis, d. emergency care of eye injuries and diseases, e. determination of eye hazardous areas in cooperation with safety officials, f. supervision of eye protection and eye hygiene, g. promotion of proper lighting, and, h. finally, indoctrination and education of employees.

When a request to establish an occupational vision program at an Army installation is received by the USAEHA, an occupational vision consultant from the Vision Branch is assigned to the project. The optometrist to whom the project is assigned then prepares correspondence to be forwarded to the installation through channels informing the installation of the date of the proposed visit. Included also is a request for two copies of the job titles of all post personnel, listed by section. This listing is to be made available to the occupational vision consultant upon his visit to the installation. Upon a visit to an installation the following material is carried: a. occupational vision file records of the installation to be visited, b. photographs of Wise Owl Club members who have had eyes saved by safety glasses, c. safety glasses to be used when the consultant is in eye-hazardous areas, d. literature on protective clothing and equipment, e. copies of AEHA manual "Occupational Vision and Illumination," f. sample copies of an open-end contract to

be used as an aid to the Post Procurement Officer in obtaining safety spectacles, and, g. grading templates for use with the vision-screening program.

Upon arriving at the installation the consultant arranges with the Post Surgeon for an entrance conference with the Post Commander. At this conference the consultant brings out the salient features of the occupational vision program. The need for the program is discussed using such background material as safety photographs, Wise Owl Club literature, and statistical results of industrial studies. The main components of the program, vision-screening and establishment of job-vision and eye-protection standards, are discussed. The funding authority is also quoted and it is pointed out that the program may be operated with existing personnel. Finally a resumé of the results to be expected of the program is given. Let me emphasize the point that the success of the program depends to a large extent on obtaining the support of the Commanding Officer who is comparable in a private industrial concern to top management.

In the light of such backing we may proceed to indoctrinate key personnel of the installation, in the methods and value of the occupational vision program. We then proceed to inform each staff section beginning with the medical section. You will note that up to this point the program has been mainly educational; however, beyond this, the program begins to present itself in its functional form.

When the Post Surgeon is visited, the same basic features are set forth that were explained to the Commanding Officer, with special emphasis being placed on the medical responsibilities of the program. One of the questions that the Post Surgeon is sure to ask is, "Which personnel will I delegate to operate the screening program?" The USAEHA handbook "Occupational Vision and Illumination" suggests that preventive medicine personnel be utilized in the screening program. However, the decision of which personnel to use in vision-screening rests with the Post Surgeon. Enthusiastic cooperation of the Post Surgeon is characteristic of all programs, and continuous liaison is maintained with him throughout the initiation of the program.

After personnel have been delegated to operate the screening program the consultant instructs them in the use of the screening instrument and in the basic procedures involved in their part of the vision-screening program.

The basic procedures stressed, as first steps to successful implementation of the program are:

a. To arrange a satisfactory screening date with the job super-

visor of the section to be screened. (It is explained to the job supervisor that the vision-screening instrument is portable and may be taken to the section which is to be screened.)

b. Vision-screening record cards are sent to the section to be screened, for typing of the employee's name, department, and job title.

c. On the day and hour arranged, the vision-screening instrument is taken to the section and the screenings are made. The only time lost by the employee is the time involved in the screening.

d. At the end of the day the cards are checked against the vision standards template for the occupation concerned and the doubtful records are taken to the Post Optometrist for his recommendation.

e. The referral form is filled out for every employee who fails to meet the vision standard for his job, and addressed to the eye doctor of his choice. This form is designed so that appropriate blocks may be checked and the patient referred if minimum standards for the job are not met. The appropriate block is checked when employees do not meet minimum vision requirements for their job, and need safety glasses. The form contains the prescription record and frame measurements. The screening record card is then placed in a suspense file. When the employee returns with the results of his visual examination he is rechecked to note if his visual skills have been corrected to the degree that he meets the minimum standards recommended for his job. The screening record is then removed from the suspense file and both the original and the recheck screening record are placed in the main file.

f. A copy of the patient's new prescription is then forwarded to the Safety Director who indicates the type of eye protection that is needed. He forwards the prescription to the Property Office for initiation of the purchase request for prescription safety glasses. Frame measurements for plano safety glasses may be made by the Post Eye Clinic or the patient's own doctor. After the safety glasses have been procured, the new glasses are sent to the Post Optometrist who verifies the prescription, or the glasses may be sent to the patient's eye doctor who verifies and adjusts the new glasses.

After the visit to the Medical Section is completed the consultant goes to the Post Safety Director who invariably offers enthusiastic cooperation. The Post Safety Director arranges to accompany the consultant on a survey of all eye-hazardous operations on the post.

Before the survey is started, a visit is made to the Chief of Technical Services to obtain his cooperation and to apprise him of the visits to be made to the various technical services on the Post. (Examples of technical services are: Ordnance, Signal, Quartermaster, Engineer.)

The survey of vision requirements and eye-safety requirements may take from one to three weeks depending on the size of the installations. Upon completion of the survey, the consultant visits the Chief of Civilian Personnel who is interested in the vision program inasmuch as it affects job placement. The Chief of Civilian Personnel is instructed in the use of job-vision standards in connection with the employee utilization program. He is provided with an AEHA manual, extra copies of the vision standards, and a copy of the job title listing. It is interesting to note the increasing importance being placed by Command and Personnel on the vision-screening aspects of the occupational vision program. At an Army industrial installation where an occupational vision program had been established, Command requested that a study be made on a missile production shop. This particular shop had a very low production record. After vision-screening had been accomplished at the shop it was found that seven employees could not be corrected adequately to meet the exacting requirements of electronic assembly. These individuals were transferred to other missile assembly jobs that were within their visual capabilities. It was also found that nearly one-third of the employees who wore spectacles were in need of referral. The production record immediately came up to expectations after the vision difficulties were corrected. Needless to say, Command was greatly impressed.

Next a visit is made to the Post Procurement Officer since safety glasses for civilian employees are an item of special purchase. A sample copy of an open-end contract and a copy of the military specification on safety glasses is explained, emphasis being placed on the importance of establishing an open-end contract so that procurement of safety glasses can be expedited.

A conference is then held with the Post Public Information Officer to arrange for publicizing the vision program among Post employees. An exit conference is then held with the Commanding Officer, the Post Surgeon, the Safety Director, and the Civilian Personnel Officer. Final plans for efficient coordination are discussed.

After the Occupational Vision Consultant returns to USAEHA he prepares a report on the initiation of the program. When the report is completed it is forwarded to The Surgeon General's Office and then to the Army headquarters of the Post that has been visited (United States is divided into six Army areas.) The report is then forwarded to the Commanding Officer of the Post at which the occupational vision program was initiated. The report contains in addition to an account of

the initiation of the occupational vision program, recommendations concerning the program.

Revisits are made every three years, or on request of an installation. A revisit follows much the same form as an initiation except that an occupational vision survey is not made unless the job title listing has greatly changed. Questions are asked regarding the operation of the program at all levels. Upon the consultant's return to USAEHA a report is made and sent through the same channels mentioned earlier. Recommendations are made in the report concerning the ways in which the program may be improved.

Perhaps this account of initiating an Army Occupational Vision Program may prove useful to those who are developing a program in civilian industry.

I would like to point out the importance placed on occupational vision by many persons, including the President of the United States, in their comments in the 50th Anniversary issue of the OPTOMETRIC WEEKLY. The National Society for the Prevention of Blindness estimates that 300,000 eye accidents occur in industry each year. Good occupational vision programs could eliminate almost all of these eye accidents. The challenge is present and the road open. It is the duty of all optometrists to exert what effort they can toward eliminating the scourge of traumatic blindness from our Nation.

A TESTIMONIAL DINNER FOR WILLIAM C. EZELL

A testimonial dinner for Dr. William C. Ezell, founder of the American Optometric Foundation, is scheduled for Friday evening, June 16, in the Hilton at Denver, Colorado. The dinner will begin at 7:45 P.M. in the Empire Lounge. Its position on the 1961 program of the American Optometric Association's 64th Annual Congress makes it the first extra-curricular event of consequence in what is shaping up as the biggest AOA Congress to date.

The dinner, at which Dr. Ezell will be honored by top names in the optometric field, marks Dr. Ezell's retirement as AOF president of the Foundation after 14 years in office.

Dedicated to the service of his profession as few men have been, Dr. Ezell has a long list of professional and civic credits to his name. He has seen the Foundation develop to the point where establishment of a central office became the next natural step forward, and such an office was established this spring in St. Louis, Missouri. Dr. Ezell will continue his association with the Foundation as a member of the AOF Board of Directors and will maintain his practice in Spartanburg, South Carolina.

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THE OPTOMETRIC-MEDICAL RELATIONSHIP

The "Optometry Question" has been discussed by medical speakers and writers since the first optometry law was established in Minnesota in 1901. "Interprofessional Relations" with particular emphasis on optometric-ophthalmological relationships have been discussed by optometric speakers and writers during the same sixty year period.

On two occasions—in 1935 and again in 1955—the American Medical Association passed resolutions declaring it unethical for physicians to have certain professional relations with optometrists. During a brief 5 year period until 1955 when these resolutions were not in effect, the National Interprofessional Committee on Eye Care met. At its meeting in December of 1951, this committee approved the official policy[1] of the American Optometric Association on interprofessional referrals of patients as follows:

"Referral of patients to ophthalmologists by optometrists and vice versa should be on a consultation basis with full reciprocal professional

courtesies and privileges. Optometry appreciates that it may be necessary for the ophthalmologist to conduct a refraction or other investigation of the visual status in the diagnosis or treatment of ocular or other pathology. In case of the referral of a patient to an ophthalmologist by an optometrist, the former should give the latter a confidential report, which should include any information which may be coordinated in affording the best optometric care to the patient by the optometrist. The ophthalmologist should not furnish a prescription or advice relating to the optometric phase of the patient's condition to the patient."

With this statement as a guide, interprofessional referrals of patients has become common place. It has been estimated that optometrists refer about 800,000 patients annually and well over 80 per cent of these patients are referred to physicians or ophthalmologists.

Optometrists generally have accepted the propositions that refraction properly belongs both in the field of optometry and ophthalmology and that it is absurd for every one performing refractions to have medical and surgical training. These views have also been expressed by Post.[2, 3]

The official position of optometry was made abundantly clear when the House of Delegates of the American Optometric Association in July, 1959, adopted Optometry's Premise which states in part:

"The profession of optometry, with a thorough education in physiological, psychological, mechanical, physical and geometrical optics, in addition to a broad foundation in other sciences such as physiology, anatomy and pathology, provides its practitioners with a complete and thoroughly rounded preparation for the vision care of mankind.

"This fundamental training, with emphasis on the psychophysiology of vision, underlies modern optometry's concept and practice of functional vision care. In addition to good acuity, optometry is dedicated to the practice of preventive optometry, as well as to the comfort and efficiency of the patient's vision.

"The treatment of pathological conditions and eye surgery is acknowledged by optometry to be in the field of medicine. However, for the protection of the public, and in order to make proper referrals to other practitioners and specialists, optometrists must continue to be well trained in the detection and recognition of ocular signs of pathology."

Another indication of the intent of practicing optometrists to practice optometry and not medicine and surgery is to be found in those states where the restrictive clause "without the use of drugs" is not included in the legal definition of optometry. Indiana is one of these states. The Indiana Optometry Law has not been amended since 1935,

therefore this legal definition has been in effect for a full quarter of a century or longer. If any optometrist in Indiana is encroaching upon the field of medicine and surgery, no one has been made aware of the situation. In all probability this is also true of the other states with similar legal definitions. Furthermore, in those countries where the use of drugs by optometrists or refracting opticians is permitted, there is no evidence of a movement to encroach upon the field of medicine and surgery.

Why do not optometrists show an inclination to enlarge their field of practice to include medical and surgical techniques? There are no doubt many answers to this question, but here we might list just a few.

1. Most optometrists chose this field because their interests and abilities would make for the successful practice of optometry. These interests and abilities would not necessarily make for the successful practice of medicine and surgery.

2. The public has become accustomed to the type of visual care to be found in an optometrist's office. The public would be unlikely to accept at this time without question medical and surgical care in an optometrist's office.

3. The patient with a condition requiring ophthalmological diagnosis may have a very serious condition in that either his vision or his life is endangered. Psychologically, these patients are better prepared to accept the diagnosis and treatment after receiving the opinion of two or more persons rather than one. General physicians and optometrists refer these patients regularly for the betterment of their patients. Not only is the patient better off, but the professional stature of all concerned is enhanced when these referrals are made properly.

It is the writer's opinion that differences of opinion between professional groups and even among members of the same profession are to be expected because of the highly independent character of professional people. But when these differences of opinion reach the extent that the public welfare is endangered, the professions involved are no longer carrying out their full responsibilities to the public. Why should it be unethical for a physician to cooperate with an optometrist in the proper referral of patients? Why should it be unethical for a physician to cooperate with optometrists in school vision surveys or public health programs to detect possible causes of blindness such as keratoconus, glaucoma, etc.? Why should it be unethical for physicians to cooperate with optometrists in the establishment and development of Eye Banks throughout the country?

After sixty years, is it not time for the leaders of the American Medical Association and the leaders of the American Optometric Association to compose their differences so that those physicians and optometrists who desire to do so, may cooperate professionally without coercion at the local level so long as the best interests of their patients and the public are paramount?

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SPECIAL REPORT

VISION SCREENING AND THE WELFARE OF CHILDREN AND YOUTH*

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Shaker Heights, Ohio

Vision is the avenue by which we gain at least 80 per cent of our knowledge. Consequently, vision plays a dominant role in learning and affects the performance of the whole child. It also plays a dominant role in the child's adjustment in society, his health, and his welfare.

Optometry's professional services are dedicated to the visual welfare of the total public.[1] Therefore, optometry has a responsibility to provide leadership in the development of vision conservation programs for our children and youth.[2]

An important problem needing the careful consideration of optometry is the role of vision screening in a school vision conservation program. This paper seeks to stimulate thinking on this important problem to the end that optometry may develop some consensus regarding it.

SCREENING PROBLEM CHARACTERIZED BY CONTROVERSY

At present, the subject of vision screening is characterized by con-

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troversy. This is true both within the profession of optometry and between optometry and medicine. Intra-professionally, some state optometric associations do not approve of visual screening, others feel screening should be done by professional people and still others are of the opinion that lay persons should do the screening. Sometimes this difference in opinion is affected by the laws of the particular states which specify how screening is to be handled.

Inter-professionally, there is general disagreement between ophthalmology and optometry on the subject. Educators and psychologists, interested in children, are concerned with vision screening. However, they are often left to struggle in a sea of confusion because of the conflicting information they receive from opthalmology and optometry.

Lay persons involved in vision screening often do not fully understand vision and the complex process of vision which operates when a child reads or uses his eyes to learn.[3] There is general lack of understanding of the visual defects screened by the various instruments and their relation to learning. We find responsible lay persons approving one screening instrument and condemning another of almost identical design and providing comparable screening tests for the same visual factors.

Controversy will continue until the leaders of the professions understand the issues and make a concerted effort to take appropriate action.

DIFFERENCES BETWEEN OPHTHALMOLOGY AND OPTOMETRY

The controversy between ophthalmology and optometry on vision screening is directly related to the difference in the training and field of practice of the two professions. Understanding this difference is basic to building satisfactory screening programs. As stated by Fry,[4]

> "Ophthalmologists must be experts in such fields as pathology of the eye, the growth, genetics, metabolism and circulation of the eye, and the maintenance of intraocular pressure."

On the other hand, he states that:

> "Optometrists concern themselves with the basic field of physiological optics, and in the applied fields such as refraction, orthoptics, contact lenses, subnormal vision and aniseikonia, and vision in schools and industry."

Kelley[5] summarizes the differences between the services rendered by the two professions in the following table:

OPHTHALMOLOGY	OPTOMETRY
1. Primary emphasis on refractive status of the eye with accommodation paralyzed by cycloplegia.	1. Emphasis on visual functioning with accommodation operative.
2. Much more emphasis on far-point measurements than measurements made at near-point.	2. Much greater emphasis on near-point measurements, and on the relations between near- and far-point measurements than in ophthalmology.

3. Tendency to emphasize structure and structural defects.	3. Tendency to emphasize function and disorders of function.

It has been suggested[6] that another category should be added:

4. Training in eye surgery is paramount.	4. Training in physiological optics and applied optics is paramount.

Ophthalmology is especially interested in those conditions of the eye and its appendages which require the use of medicine or surgery. Optometry has more training than any other profession in physiological, psychological and ophthalmic optics. Understanding these basic differences between the professions makes it easier to understand some of the controversial factors.

Ophthalmology is especially interested in screening for gross refractive errors and strabismus. This has been made clear through their insistence on limiting vision screening to Snellen testing or the additional tests provided in the Massachusetts type program (Snellen, plus lens, muscle imbalance). There is, however, considerable disagreement among ophthalmologists on including tests other than the Snellen. In *Standards for Referral of School Children for an Eye Examination*,[7] a preliminary report on recommendations of committees appointed by the New England Ophthalmological Society and the Massachusetts Medical Society Section of Ophthalmology and Otolaryngology to study the school vision test problem we find:

". . . the committee recommends in spite of the fact that the questionnaire revealed equivocal responses as to the place of the heterophoria test that such a test be included in the school examination, but that it need not be done on the children of the group up to the fourth grade. . . . It is felt that to omit a test for heterophoria would be the same as stating that heterophoria is not capable of producing symptoms and since nearly 50 per cent of those questioned felt the need for such a test the committee agrees that the test should be continued at least for the time being."

Optometry, on the other hand, is concerned with the functioning of the total process of vision for each specific task. As stated elsewhere,[8]

"Optometry, with its interest in visual function and thus the visual skills needed for learning in the classroom, would like to have all screening programs for school children include tests of visual efficiency at the reading distance."

OVER- AND UNDER-REFERRAL

These differences in practice between the two professions is evident in the study of "over-referrals" of screening programs. Some studies have shown that when children are referred for failure on Part III (the muscles imbalance test) of the Massachusetts type test, a significantly lower percentage are found to be in need of care when examined by ophthalmologists than when examined by optometrists. Other studies disclose that when screening includes tests of binocular functions, a great percentage of those designated over-referrals by opthalmologists were referred for failure on tests of binocular functions.[9]

A significant statement is made on the problem of over- and under-referral in the Orinda Study:[10]

"The most significant over-all cost in a vision-screening program will be the expense to the individual families, or to the community resources, for clinical examinations of the children screened out as needing professional attention. If there is significant over-referral, the cost will be increased needlessly. In addition to wasting community resources, over-referrals may well destroy confidence in the program. If there is significant under-referral, many children needing professional attention will not be detected, although screening costs will be minimized. In terms of visual health and welfare, *the hidden costs of under-referrals are inestimable.*" (Emphasis supplied.)

When the screening program does not include tests of binocular vision function at the reading distance, many children needing vision care are not discovered.[11, 16] When vision difficulty continues to interfere with achievement in school, the child may fail. Failure in school often leads to maladjustment both in and out of school with ensuing unfavorable social consequences, either in the form of emotional disturbance or compensatory activities which at times lead to juvenile delinquency.[12] The result of any of these consequences is a waste of the natural resources of the child. Many of these children are needlessly referred from one specialist to another in an effort to find the cause of non-achievement. Their true problem is by-passed because they have passed a vision screening test which was so limited that it did not appraise their visual function, in terms of visual abilities needed for reading achievement.

LOWEST COMMON DENOMINATOR

In studying the problem of over-referral, one of the best methods of preventing over-referral is to hold a meeting of the practitioners in the particular area to determine the tests to be included in the screening program and the criteria for referral. In accomplishing this goal, this type of "meeting of the minds" must not degenerate into an agreement at the level of the lowest common denominator of service for the area. The question must not become "What common visual disabilities will be considered in the professional examination of *each* practitioner in the community?"

Inherent in a program built at the level of "the lowest common denominator" is the danger of pegging professional vision care at this low level. Experience emphasizes that parents feel their children's eyes have been examined if there is a screening program in the schools. They reason that if a more thorough test were needed, it would be given. If testing is considered to be adequate at this low level, the result will be that vision care is down-graded.

DILEMMA

If there is no vision screening of school children, vision is mini-

mized in its importance to the health and general welfare of the child. When the importance of vision is not properly emphasized, many children never have their vision examined, and thus many suffer needlessly in achievement and efficiency.

If each profession, ophthalmology and optometry, goes its separate way in working with schools in developing screening programs, controversy will be the end result. Neither profession has a monopoly. Both are licensed to serve the public in the eye care field. When the rights and responsibilities of one profession are ignored, the other profession must object to the program. Controversy regarding the screening program in a school system often results in the discontinuance of the screening program. The public is confused, and, because of the confusion, does not seek the vision care available to them. This does not promote the visual welfare of the public.

If lay people do the vision screening, the tests are limited to those which lay people can administer. These are not the same as those which are usually employed in a clinical examination. Discrepancies exist, with the result that the screening program is criticized. Also, experience has shown that the old adage "a little knowledge is a dangerous thing" may apply when lay people do screening.

If professional people do the screening, there are those who feel that the screening program can be misunderstood by parents as having been a complete clinical examination and that no further examination is needed.

If the referral rate is low, many children needing visual attention are missed and their problem ignored through the false sense of security gained from passing the screening program.

If the referral level is higher than the "lowest common denominator" for the community, then the higher the level the greater will be the number of children who may be examined by doctors who will feel that there has been over-referral: criticism of the program will result.

PURPOSE OF VISION SCREENING

The St. Louis Study[9] of vision screening stated that:

"The purpose of a program for screening school children for visual defects is to find those students who need treatment or observation by an eye specialist."

The Orinda Study[10] states that:

"The two main objectives of a vision-screening program for school children are:
1. to detect those children who have vision problems, or potential vision problems, that may affect the physiological or perceptive processes of vision; and
2. to find those children who have vision problems that interfere with performance in the school."

This stated purpose of the Orinda Study is consistent with Robinson's[15] statement regarding the areas of vision which concern reading teachers:

"1. The visual difficulties most likely to inhibit reading progress:
2. means of identifying pupils with visual problems: and
3. visual manifestations which require referral for refraction even though they are not related to reading achievement."

Objectives of vision screening as stated in the St. Louis Study, the Orinda Study, and reiterated by Robinson's statement, are not being met by most screening programs in operation today.

VISION AND SCHOOL ACHIEVEMENT

When a child uses his vision to learn in school, not only are his eyes involved, but also the brain mechanisms controlling eye-movement, focus, fusion, and perceptual abilities.[3] Robinson and Huelsman,[11] studying children who fail in reading state:

"It is significant that the only visual scores which consistently differentiated high and low achievers at these two grade levels involved binocular visual performance. Furthermore, four of the five utilized convergence and divergence skills. Not one of the current visual screening batteries include these tests."

Eames states:[17]

"Seeing with both eyes at the same time, and fusing the two 'pictures' in the brain so that a single visual impression results, is called 'binocular vision' (two-eyed vision). Anything that interferes with its performance may impair reading or learning from tests. Such difficulties include poor fusion and incapacity of the muscles that move the eye."

Research[18] conducted in the Euclid schools on the relationship of vision to reading achievement found:

"1. Children who had functional visual difficulty also had poor perceptual test scores.
2. Children with functional visual difficulty had poorer reading readiness scores.
3. Children with functional visual difficulty had poorer reading achievement scores.
4. Children with poor perceptual scores had the poorest readiness and reading achievement scores.
5. Children in the lowest reading groups were:
   (a) the children with poor visual function:
   (b) those with the poorest perceptual test results.
6. Children with functional disabilities started formal reading at a later time than children with good function."

A PROPOSED SOLUTION

In order to meet our responsibility to the public to promote its visual welfare, optometry must take the position of insisting on the vision screening of children and youth in order that vision be given the importance it deserves. Since vision affects the performance of the whole child and thus plays a dominant role in the child's adjustment in society and his health and welfare, screening should begin with the pre-school child and extend through college. The aim must be early detection of vision deficiencies, with prevention and guidance of primary concern.

The key to meeting Optometry's responsibility to the public in promoting the visual welfare of its children and youth lies in the development of vision conservation programs with the screening program

an integral part of the larger vision conservation program.[19] The larger vision conservation program would have as its aims:

1. to minimize the effect of visual deficiences:

2. to educate parents on the importance of good vision to a child's welfare: to facilitate follow-up and promote good visual hygiene in the home:

3. to teach school principals, supervisors, teachers, psychologists and nurses the visual needs and abilities of school children: to help the teacher learn to observe symptoms of visual difficulties which children display in classrooms: to help the teacher learn to adjust teaching methods and materials to meet the visual needs of the child and to control environmental factors such as seating and lighting which affect visual performance: to use the screening program to stimulate interest in the study of vision and the development of good habits to promote vision welfare through life.

Since there are two professions serving the eye-care field, it is incumbent upon these professions to work together to help plan the screening program, to select the tests used, and to agree upon criteria for referral.

Kelley[5] states:

"With the field of visual care divided as it is, practical visual screening procedures must be designed with both medical and optometric viewpoints in mind. Any adequate criterion of visual screening procedures is neither an 'optometric' nor an 'ophthalmological' criterion, but both. An effective screening procedure is one that distinguishes children judged in need of professional examination by *either* the best clinical judgment of ophthalmologists or that of optometrists. Such a criterion is a practical necessity if screening tests are to be evaluated fairly and accurately in terms of their practical usefulness in the schools. A combined criterion offers no great difficulties in principle or application. The most serious single criticism of the St. Louis Study is that it failed to develop the fair, adequate, and representative criterion it needed to make its judgments of screening efficiency."

The Orinda Study, the Euclid program, and others testify that interprofessional cooperation can be a reality.

In a recent article, Sloane and Rosenthal[20] urge the appointment of a committee representing all major ophthalmological societies. They state:

"This committee would work closely with a strong lay organization, such as the National Society for the Prevention of Blindness which would act as a liaison between the committee and all individuals or groups interested or already active in school vision testing."

Optometry is not specifically mentioned, but would obviously have to be included. In light of past experience, qualification of the National Society for Prevention of Blindness to act in an unbiased liaison capacity can be seriously questioned. A recent editorial in *The Optometric*

Weekly[21] pointed up this fact in commenting on an article on vision screening:

"In the March, 1959, issue of *The Lion*, official publication of Lions International, is an article on the subject authored by E. G. Gill, president of Elbryne G. Gill Eye and Ear Foundation of Roanoke, Va., and Franklin M. Foote, executive director of the National Society for the Prevention of Blindness. These two M.D.'s profess to examine screening methods and equipment to help Lions clubs render better service in their sight programs. Despite this worthy purpose, their recommendations are very biased and open to serious question—and the many optometrists and educators who are members of local Lions clubs, or who are members of the NSPB, should take critical exception to the conclusions of this article. . . .

"It is amazing that the executive director of the NSPB should forget that he is an administrator of a lay organization and lend his medical title and name to an article that is biased in favor of his profession's preferences. An independent lay organization in the field of visual care and sight conservation such as the NSPB is failing in its role of leadership when its approach to visual screening—an important facet of visual care and sight conservation—is so biased. School screening calls for complete cooperation and inter-professional effort for best results. You can't get cooperation, research and best results by endorsing one-sided viewpoints."

This article in *The Lion* and, in addition, the NSPB sponsored St. Louis Study of vision screening which was based solely on the opinion of Ophthalmology, cause us to question the right of the National Society for Prevention of Blindness to serve as liaison in a non-biased capacity.

As stated in the American Optometric Association's *Report to the 1960 White House Conference on Children and Youth*:[2]

"Regardless of the admittedly controversial pros and cons of the methods and procedures used in the various evaluation studies which have been conducted into vision screening, the fact is that better results can be achieved in vision screening if there is a willingness on the part of all professions and disciplines concerned in this matter to join together in a determined attack on the problem. The optometric profession is sincerely anxious to help foster such an inter-professional approach with ophthalmology similar to the type of approach it has fostered in the care of brain-injured children in cooperation with educators, pediatricians, psychologists, social workers, nurses and other groups. Experience in these joint efforts has proved that effective procedures can be worked out cooperatively, even though it may occasionally entail some compromise of professional prerogatives for the sake of the common good."

A screening program for each community can be planned best with optometry and ophthalmology cooperating as members of a steering committee or coordinating council, with additional representation from parents and school personnel. This larger committee, with the aid of the two professions, would decide whether lay or professional people would do the screening, the tests to be used, the criteria for referral, and have the responsibility for developing the vision conservation program outlined above.

The best person to serve as Chairman of this steering committee or coordinating council would probably vary in each community. In the Orinda Study, he was a public health officer. In the Euclid Program, she was a reading supervisor. The Chairman will need to be a strong, informed, unbiased person, devoted to building programs for the welfare of children and youth.

It is important that education of the school community include knowledge of the total process of vision which operates for visual learning and that the *limitations* of screening be stressed in order to safeguard the welfare of children whose visual deficiencies are not detectable in the screening tests used.

It is important that teacher observation of symptoms of vision difficulty be encouraged through teacher education and that teachers use this observation as an important adjunct to the screening program. This is needed as an additional safeguard of the welfare of those children whose visual deficiencies will not be detected by the screening program.

Because of the limitations of what can be accomplished in a screening program, Optometry should join with Education and Psychology in research to devise performance tests which could be used to reveal visual inadequacies. Such tests would serve as helpful adjuncts to the screening program.

There must be studied effort to up-grade the vision care available in the community through increased knowledge of vision and the visual abilities children need for school achievement. This is needed to offset the effect of the "lowest common denominator" problem.

A true vision conservation program should gradually promote enlightenment and the realization of the need for interprofessional referral between ophthalmology and optometry: optometry should refer to ophthalmology, for its specialty in medicine and surgery: ophthalmology should refer to optometry, for its specialty in vision functions requiring orthoptics, visual training or special lens treatment.

Combined efforts of ophthalmology and optometry, each giving of its own specialized knowledge and service, with the child as a focus point, will offer best results in promoting the visual welfare of the children and youth of our country.

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CONVENTIONS

AMERICAN OPTOMETRIC ASSOCIATION—64TH ANNUAL CONGRESS

June 17-20, 1961, Hilton Hotel, Denver, Colorado

"Our Colorado committee has done an outstanding planning job and I am looking forward to the best Congress in history when the American Optometric Association meets in Denver June 17-20," AOA President Richard C. Schiller, O.D., says.

"I think the delegates and guests at the Denver meeting will be particularly pleased with the work Dr. Wendell E. Bryan, Education Committee chairman, has done on the program, which will include 22 hours of lectures and clinics, with an opportunity for optometrists to participate in special contact lens modification and verification workshops.

"This feature, plus all of the plans which the committee has in other fields of optometric education, should make attendance at the Congress very attractive for all optometrists.

"We are counting on a record attendance at the meeting," Dr. Schiller continued. "Each new year has brought a national growth of interest in the work of the American Optometric Association, and we expect this to continue in Denver. The Colorado committee has planned a program which will tap the rich Western historic resources of the Denver area to give the program for the youngsters a truly Western flavor. One of the highlights of the Congress will be a visit to the new U. S. Air Force Academy followed by a Chuckwagon Dinner in the world-famous Garden of the Gods near Colorado Springs."

EDUCATIONAL PROGRAM—64TH ANNUAL AOA CONGRESS

Hilton Hotel, Denver, Colorado, June 17-20.

Dr. Wendell E. Bryan, Chairman.

SATURDAY, JUNE 17, 1 P.M. to 4 P.M.—IA Clinic Sessions (Run concurrently).

Course #IA-1—VISUAL TRAINING—Instructor, Dr. Harold Haynes, Pacific University, College of Optometry.

Course #IA-2—PRACTICE MANAGEMENT—Instructor, Dr. Frederick Kushner, Chairman, Practice Management Committee AOA.

Course IA-3—VISUAL PROBLEMS OF CHILDREN AND YOUTH—Instructors, Dr. Lois Bing, Chairman AOA, Committee on Visual Problems of Children & Youth; Dr. Henry Peters, University of California, School of Optometry; Dr. Otto Bebber, Member Professional Committee on Vision, Jefferson County, Colorado.

SUNDAY, JUNE 18, 9 A.M. to 12 Noon—Clinic Sessions Continued. IIA Clinic Sessions (Concurrently).

Course #IIA-1—VISUAL TRAINING—Instructor, Dr. Haynes.

Course #IIA-2—PRACTICE MANAGEMENT—Instructor, Dr. Kushner.

Course #IIA-3—VISION PROBLEMS OF CHILDREN & YOUTH—Instructors, Dr. Bing, Dr. Peters, Dr. Bebber.

SUNDAY, JUNE 18, 1 A.M. to 5 P.M.—GENERAL EDUCATIONAL SESSION. CONTACT LENS LECTURE SERIES.

1 P.M. to 1:30 P.M.—SCREENING THE CONTACT LENS CASE—Lecturer, Dr. Don West, Pacific University College of Optometry.

1:30 P.M. to 2 P.M.—PHYSICAL CONSIDERATIONS IN FITTING CONTACT LENSES—Lecturer, Dr. Max Schapero, Los Angeles College of Optometry.

2 P.M. to 2:30 P.M.—DETERMINING THE CONTACT LENS PRESCRIPTION —Lecturer, Dr. John Neill, Pennsylvania College of Optometry.

2:30 P.M. to 3 P.M.—INITIAL FITTING PROCEDURE—Lecturer, Dr. Lester Beacher, New York City, N. Y.

3 P.M. to 3:30 P.M.—CONTACT LENSES FOR CHILDREN—Lecturer, Dr. Chester Pheiffer, University of Houston, College of Optometry.

4 P.M. to 4:30 P.M.—CONTACT LENSES FOR SPECIAL OCCUPATIONS—Lecturer, Dr. Samuel Alperen, Lewiston, Maine.

4:30 to 5 P.M.—CONTACT LENSES IN SPORTS—Lecturer, Dr. Robert Lester, University of California, School of Optometry.

7 P.M. to 10 P.M.—Clinic Sessions (Concurrently).

Course III A & B-1—VISUAL TRAINING—Instructor, Dr. Haynes.

Course III A & B-2—PRACTICE MANAGEMENT—Instructor, Dr. Kushner.

Course III A & B-3—VISION PROBLEMS OF CHILDREN & YOUTH—Instructors, Dr. Bing, Dr. Peters, Dr. Bebber.

Course III A & B-4—CONTACT LENS VERIFICATION—Instructors, Dr. Schapero, Dr. Pheiffer, Dr. Neill, Dr. Beacher. CONTACT LENS MODIFICATION—Instructors, Dr. West, Dr. Martin, Dr. Alperen, Dr. Lester.

MONDAY, JUNE 19—*A & B*—GENERAL EDUCATIONAL SESSION—PSYCHODYNAMICS OF VISION.

9 A.M. to 12 Noon—Downtown Campus, University of Denver.

9 A.M. to 10 A.M.—EMOTIONAL ASPECTS OF COMMUNICATION—Speaker, Bernard Spilka, Ph.D., Director Projective Testing, Dept. of Psychology, University of Denver.

10 A.M. to 11 A.M.—COMMUNICATION ASPECTS OF DISTURBED PERCEPTION—Speaker, Elwood Murray, Ph.D., Director Dept. of Speech, University of Denver.

11 A.M. to 12 Noon — PSYCHOLOGY AND THE VISION SPECIALIST — Speaker, A. D. Kleyhauer, O.D., Staff Clinician, Dept. of Psychology, University of Denver.

TUESDAY, JUNE 20TH, 9 A.M. to 12 Noon.
IV A Clinic Sessions (Concurrently).

Course IV A-1—VISUAL TRAINING—Instructor, Dr. Haynes.

Course IV A-2—PRACTICE MANAGEMENT—Instructor, Dr. Kushner.

Course IV A-3—VISUAL PROBLEMS OF CHILDREN & YOUTH—Instructors, Dr. Bing, Dr. Peters, Dr. Bebber.

Course IV A-4—CONTACT LENS VERIFICATION—Instructors, Dr. Schapero, Dr. Pheiffer, Dr. Neill, Dr. Beacher. CONTACT LENS MODIFICATION—Instructors, Dr. West, Dr. Martin, Dr. Alperen, Dr. Lester.

TUESDAY, JUNE 20TH, 1 P.M. to 4 P.M.

(A) *SYMPOSIUM*—CONTACT LENSES FOR POST-SURGICAL AND PATHOLOGICAL CASES—Lecturers, Dr. Alfred A. Rosenbloom, Jr., Dean, Illinois College of Optometry; Dr. C. Edward Williams, Specialist in Sub-Normal Vision; Dr. William Baldwin, Indiana University, College of Optometry.

MILITARY PROGRAM—64TH ANNUAL AOA CONGRESS

Hilton Hotel, Denver, Colorado, June 17-20.

SATURDAY, 17 JUNE

8 A.M.—REGISTRATION

9-12 Noon—House of Delegates (Opening Ceremonies)

1-4 P.M.—Visit Exhibits or Attend Educational Clinic (Members' Choice)

SUNDAY, 18 JUNE

1-2 P.M.—Awards Luncheon

*2-5 P.M.—GENERAL EDUCATIONAL SESSIONS—"Special Considerations in the Prescribing and Fitting of Contact Lenses"—Military Consultant: Lt. Colonel Floyd M. Morris, USAF. (MSC)

5-6 P.M.—Reception for Military

*7-10 P.M.—EDUCATIONAL CLINIC SESSIONS—"Contact Lens Modification and Verification"—Military Consultant: Major Billy C. Greene, USA, MSC, with Capt. Mancel W. King, Optometry Section, Walter Reed Memorial Hospital.

MONDAY, 19 JUNE

*9 A.M.-12 Noon—MILITARY OPTOMETRY WORKSHOPS—"Administrative and Professional Problems"—Presiding Officers: Navy Workshop, Commander Robert L. Henry, USN, MSC; Air Force Workshop, Lt. Colonel Floyd M. Morris, USAF, MSC; Army Workshop, Major Billy C. Greene, USA, MSC.

1 P.M.—Tour Air Force Academy and Barbecue at Red Rock.

TUESDAY, 20 JUNE

7:30 A.M. - 9 A.M.—Military Optometrists' Breakfast

9 A.M. - 10:30 A.M.—SYMPOSIUM
Presiding Officer: Commander Robert L. Henry, USN, MSC
"Trends in Military Optometry"—Colonel Roy D. Maxwell, Chief of Medical Service Corps, Army.
"The Unique Role of the Military Officer"—Captain L. J. Elsasser, Chief of Medical Service Corps, Navy.
"Air Force Contributions to Science"—Colonel Bernard Korn, Chief of Medical Service Corps, Air Force.

*10:45 A.M.—Presentation of Military to House of Delegates

*1 to 4 P.M.—SYMPOSIUM—"Contact Lenses for Post-surgical and Pathological Cases"—Military Consultant: Lt. Colonel Floyd M. Morris, USAF, (MSC)

*Approval for awarding of inactive duty points requested for these sessions.

During the four day session the A.O.A. House of Delegates will be in session much of the time and the exhibits of manufacturers will be open to those in attendance. The Congress will close with a cocktail hour, banquet and dance on Tuesday, June 20.

CANADIAN ASSOCIATION OF OPTOMETRISTS—SEVENTH BIENNIAL CONVENTION

July 9-12, 1961, Halifax, Nova Scotia, Canada

Hundreds of Canadian optometrists will head East in July for their 7th Biennial Convention. Halifax, Nova Scotia, is playing host for the first time for C.A.O., from July 9th to July 12th. This is prime time in the Halifax holiday season when Atlantic breezes work air-conditioning wonders.

With one eye on the weather, the C.A.O. convention program is purposely slanted to a family holiday theme. It does not attempt to compete with Fall and Winter educational congresses. It is, however, the key event of the Canadian Optometric year and will shape the future of Canadian Optometry for the critical years ahead. This is especially true of 1961 when the role of Canadian Optometry in the "just-around-the-corner" National Health Plan is the main item of business. Every optometrist present will have a voice in this and other vital questions.

Some provinces are going to press for a strong, full-time P.R. program. Also expected to be discussed is a National Examination Board and reciprocity between provinces. At any rate the old feeling of some provinces that "we can go it alone" is being replaced by a new thinking and of course the coming convention is a reflection of this new attitude. This will be the clearing house for all ideas and the decisions and policies that are produced will have a profound effect on Canadian Optometry.

President D. L. Francis, O.D., will chair the meetings and has issued an urgent invitation to every optometrist in Canada to attend. Representatives of Supply Houses are also invited as interested spectators to all parts of the program except the actual business sessions.

Expected to raise the most animated discussion is the Brief prepared by H. C. Arnold and committee for submission to the Royal Commission appointed by the Federal Government on National Health Services. This Brief will spell out the role that Canadian Optometry should play in any National Health scheme.

THE C.O.A. CONVENTION PROGRAM

SUNDAY, JULY 9, 1961

11:00 a.m. Registration
Coffee and Sherry

2:00 p.m. Choice of:

	P.M.
Deep-sea Fishing	2:30
Yachting Cruise	2:30
Power Boat Cruise	2:30
Swimming at Waeg	2:30

Massed Band Concert
with Bengal Lancers

8:00 p.m. Informal Evening
Hour of Charm
Professional Talent
String Orchestra

10:00 p.m. Refreshments

MONDAY, JULY 10, 1961

9:00 a.m. Formal Opening
ADDRESS: Premier
Mayor
10:00 a.m. C.A.O.
11:00 a.m. C.A.O.
1:00 p.m. All-Provinces Luncheon
Induction in Order of
Good Cheer
Presentations
TV Coverage
3:00 p.m. Scenic Drive:
Peggy's Cove
Mahone Bay
Lunenburg
Swim in Breakers at
Hubbards Beach
6:30 p.m. Cocktail Party—Shore Club
7:30 p.m. Lobster Dinner
9:00 p.m. Dance: Country Style

TUESDAY, JULY 11, 1961

9:00 a.m. Dr. Bastien
10:00 a.m. C.A.O.
11:00 a.m. C.A.O.
1:00 p.m. Special Seafood Dinner and
visit to Citadel Hill
2:30 p.m. Cruise in Modern Destroyer
Open Wardroom
Tea-at-Sea
6:00 p.m. Cocktail Hour
7:00 p.m. Banquet
9:00 p.m. Floor Show

WEDNESDAY, JULY 12, 1961

9:00 a.m. Dr. Bastien
10:00 a.m. Dr. Bastien
11:00 a.m. Closing ceremonies for dele-
gates and wives
Presentations
Coffee and Sherry
THE END
1:00 p.m. Luncheon Meeting
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TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

GENERAL PROGRAM TO CONTAIN ABSTRACTS OF PAPERS AT CHICAGO

This year our Academy meeting will again be held in Chicago. Being a lover of good food your program chairman is pleased, because this is probably one of the best spots for a wide variety of top-flight meals. Any person's taste can be satisfied, ranging from an exquisite dinner of Cantonese food at Don the Beachcomber's to a succulent dish of Hasenpfeffer at the Red Star Cafe, or maybe you prefer the prime rib slab at the Embers. These are times to look forward to and remember. Just add this to a stimulating program which can put new meaning and inspiration into your future professional life and you have a combination which we cannot afford to miss.

This year will produce a fine program with probably the largest attendance in our history; brought about, first of all, by the geographical location of the meeting, and secondly and most important, the intel-

lectual progress of optometry. What other meeting can one attend and be exposed to so much in such a short time? Under what better conditions can one learn to write in a proper manner and to present a formal paper, and then be rewarded by seeing it in print in the leading publication of optometric articles in the world? Where else can educators have a better opportunity of addressing other educators and optometrists who have the open minded desire to learn and to advance? Along with all of this, our teachers have the opportunity to promote their institution to a certain extent by making others familiar with the faculty and research projects at their school.

All of these things have been working together for a number of years for the progress of our Academy and this year these same things should make it an even more outstanding meeting.

A new idea will be tried this year for the first time. Instead of our program being printed in the Journal just before the annual meeting and distributed at the registration desk with just the titles and authors, it will be published two months preceding the December meeting and will contain, not only the titles and authors, but also, a short abstract or summary of each paper that is to be presented. This will give those attending an opportunity to become familiar with the text of each paper and will give your program chairman the opportunity to organize a fuller discussion period following the presentation. As can be seen, this would make it necessary for each participant to submit the title and short abstract or summary of his paper not later than August 1st, so the program can be completed for publication. This would not alter the time that the completed paper should be submitted for editing which is September 15th.

The publishing of these abstracts should add considerably to the interest in the program and will give those who would not be acquainted with the titles an opportunity to become acquainted with them before the paper is read.

JOHN ZETTEL, JR.
PROGRAM CHAIRMAN

CURRENT COMMENTS

Terry Judith Parkins
Editorial Assistant

Optometrists will confer a favor by sending news items of general interest for this department; such as relate to new instruments, clinical techniques, education, visual health and optometric legislation and organization.

FRY HONORED AT DEDICATION

On April 16, the new $600,000 addition to the Optometry building at Ohio State University was dedicated. Several hundred optometrists and friends of optometry attended in spite of a severe April storm. The new clinical facilities provided by this building are outstanding with ample space for teaching all phases of optometric practice.

Although the announced program had to do only with the dedication of the building, several events of significance were coupled with the occasion. Dr. Glenn A. Fry, the director of the school, was honored for twenty-five years of outstanding service to the school and the profession. Dr. H. Ward Ewalt presented Dr. Fry with three volumes of letters from friends throughout the United States and from other countries. The writers of these letters thanked and praised Dr. Fry for his outstanding work in the field of ophthalmic optics and optometry.

At the dedication exercises the announcement was also made of the establishment of the *Glenn A. Fry Fund* under the Ohio State Development Program. A description of the fund follows: This fund is to honor Glenn A. Fry for 25 years of outstanding service as director of the School of Optometry, and for his many contributions to the literature and research in the field of physiological optics and for his leadership in the advancement of optometry and its service to the public. The principal and any additional contributions to be invested in accordance with Section 3335.12, Revised Code—State of Ohio, the income to be used by the director of the School of Optometry for any purpose pertaining to optometric education. Additions to the principal can be made at any time. All optometrists are invited to contribute. For further information write to Dr. Nelson E. Abrahamsen, Sr., 2808 Clark Ave., Cleveland 9, Ohio., Chairman, Honoring Fund Committee.

Another important event at the meeting was the presentation to Dr. and Mrs. Fry of a silver tea and coffee service on behalf of their many friends on the campus and in Ohio. This presentation was made by Dr. Harold Oyster, one of the local optometric leaders and a member of the Ohio State Legislature.

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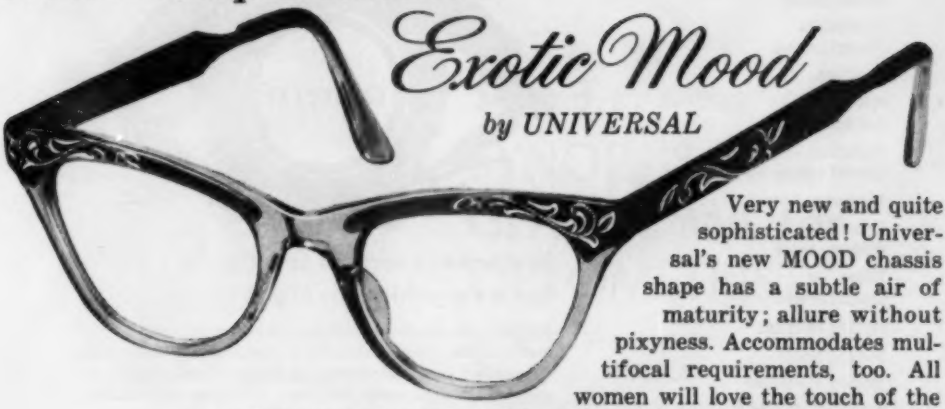

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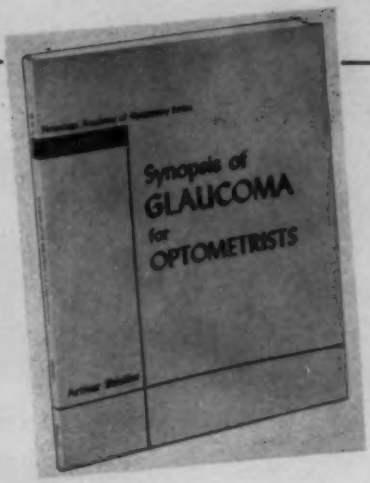

Now in its Second Printing

SYNOPSIS of GLAUCOMA for OPTOMETRISTS

Arthur D. Shlaifer
O.D., Ph.D., F.A.A.O.
Pennsylvania State College of Optometry

Reviewers say:

"This book is must reading and could well be used as a standard text in our optometric schools and colleges.

". . . the book is written in straightforward, easy to read English . . ."

ELMER S. FRIEDBERG, O.D., F.A.A.O.
Journal of the American Optometric Association

"This book fills a long felt need in optometry. The phenomenal sale of this volume indicates that thousands of other optometrists will equally benefit by owning and using it regularly. The book should be read and then kept in full view in the refracting room where its presence on the desk of the optometrist will do much to assure patients who are apprehensive regarding this pathology.

CAREL C. KOCH
Secretary F.A.A.O.
American Journal of Optometry

Contents • anatomical and physiological considerations • symptoms and clinical picture • ophthalmoscopy • gonioscopy the intraocular pressure • tonometry visual fields • etiology • the treatment of glaucoma • pathology • miscellany • a summary of optometric tests for the detection of glaucoma

Usable for both the practicing optometrist and in the classroom, this book is the first in a series of home study courses, published by the American Academy of Optometry, intended to round out its work in postgraduate education. The author is a practitioner as well as an educator. His work covers etiology, clinical signs, symptoms and screening tests used to facilitate the understanding of glaucoma detection and referral.

The subject matter is designed to present the noticeable features of glaucoma to facilitate detection by the optometrist, and subsequent referral to an ophthalmologist.

In addition to this information, all aspects of the disease are covered so that the optometrist will be familiar with procedures used by the ophthalmologist in treating cases which he has referred.

Now in its second printing, Synopsis of Glaucoma for Optometrists is being used in a number of postgraduate study courses. Optical distributors and manufacturers of ophthalmic supplies throughout the country have been successfully selling the book.

It treats the subject matter authentically, briefly, yet completely, according to the American Academy of Optometry requirements.

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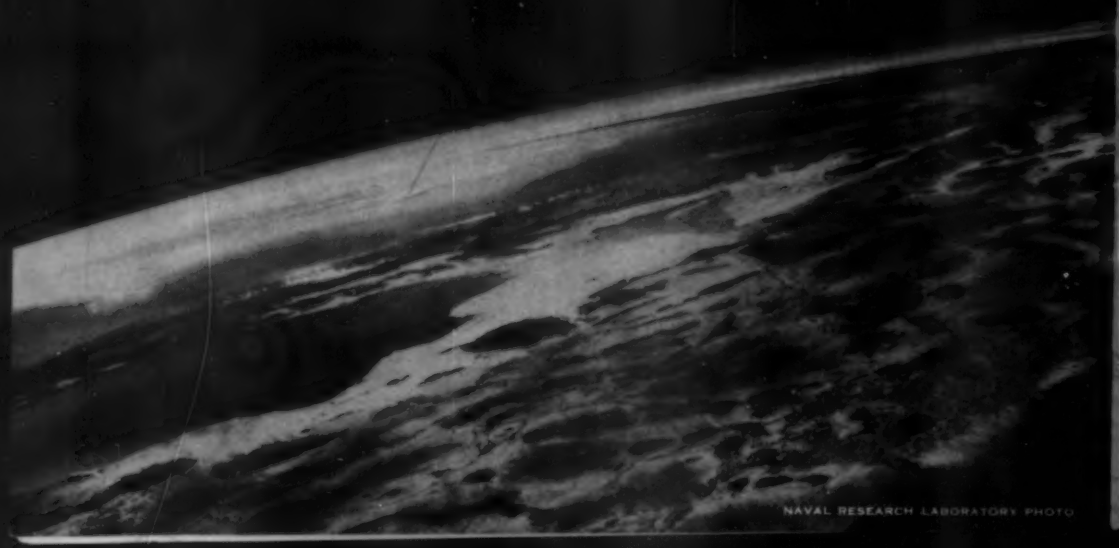

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